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OFFICIAL PUBLICATION OF THE PROCEEDINGS AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

American Dyestuff Reporter was founded in 1917 and the Textile Colorist and Converter (formerly Textile Colorist) was incorporated with it in January, 1949. Published every other Monday, by the **HOWES PUBLISHING COMPANY, INC.**, 44 East 23rd Street, New York 10, N. Y. **C. R. Howes**, President; **Ernest J. Finan**, Executive Vice-President; **Norman A. Johnson**, Vice-President & Treasurer; **Myron D. Reeser**, Vice-President; **Clara Patrick**, Secretary.

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AMERICAN
DYESTUFF REPORTER
DEVOTED TO TEXTILE WET-PROCESSING

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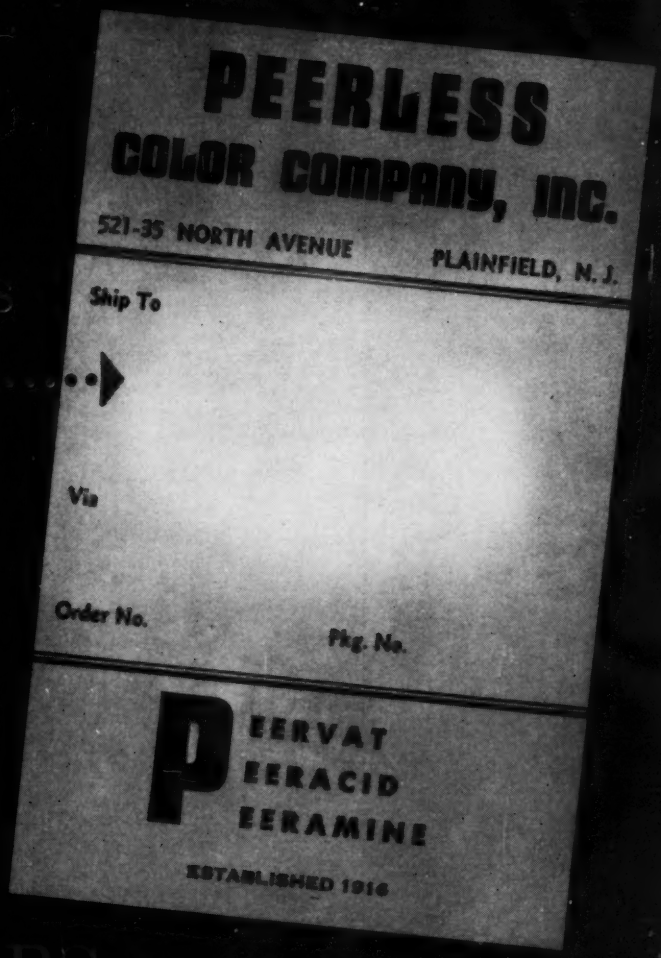

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AMERICAN

DYESTUFF REPORTER

Volume 49 August 22, 1960 No. 17

REPLACING THPC IN THE APO-THPC FLAME-RESISTANT FINISH FOR TEXTILES

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INTRODUCTION

TRIS-1-aziridinyl phosphine oxide $(\overline{CH_2CH_2N})_3PO$ (*1*) in combination with tetrakis hydroxymethyl phosphonium chloride (*7*) is a flame retardant for cotton textiles. It appears that phosphorus compounds other than THPC can be used in combination with APO to impart flame resistance.

An infrared method for the rapid screening of candidate catalysts for the polymerization of APO is described. Of the wide variety of chemicals screened, compounds that are acidic under curing conditions are the most effective catalysts. One of these catalysts, diammonium phosphate, combined with APO produces a new durable flame retardant for cotton.

In studying the curing conditions for APO, a technique has been developed for the rapid screening of catalysts. A comparison of the infrared spectrum of APO before and after curing (Figure 1) shows that the absorption at 12.3 microns disappears upon curing.

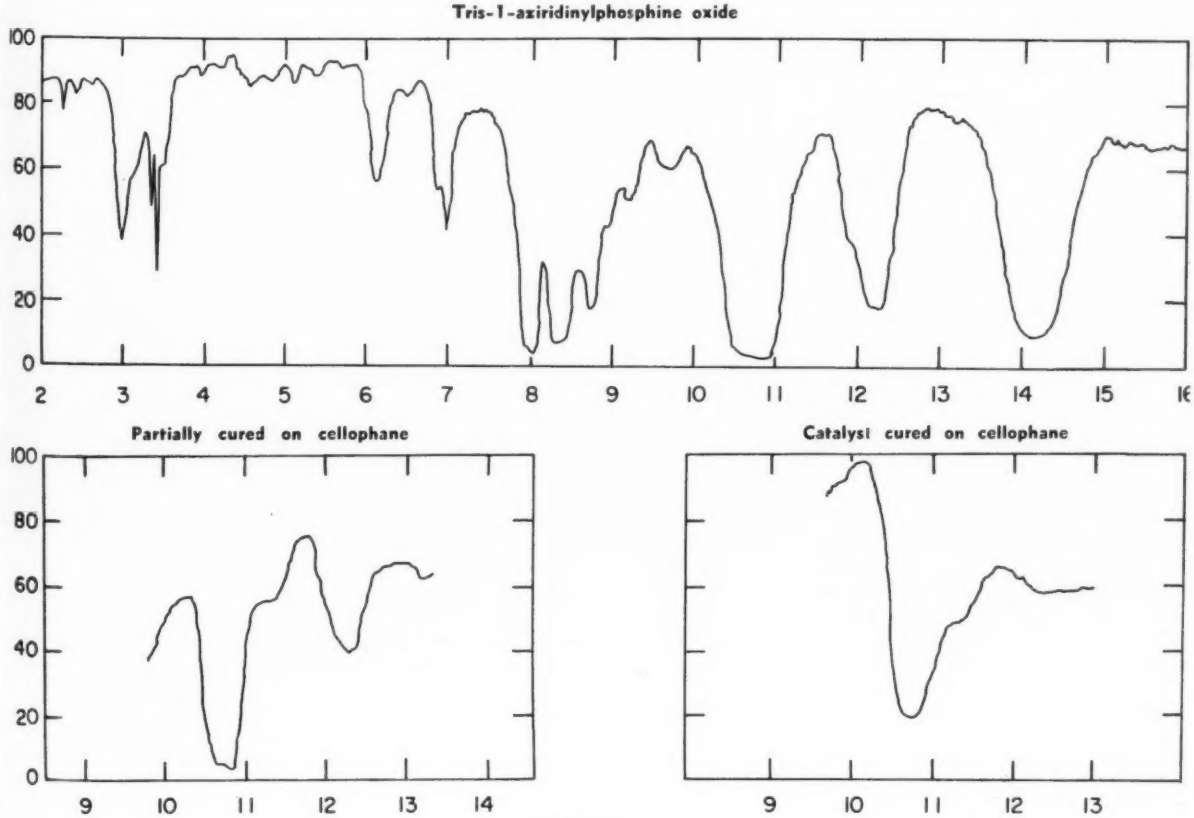

Figure 1
Infra-red spectra of APO showing change that occurs during curing

To illustrate this, Figure 2 lists the absorption spectrum of a sample of APO which has been partially polymerized by air aging for three weeks as well as the spectra of the monomer, a commercial product (3), and that of a sample that has been completely polymerized at reduced pressure. Also shown for each sample is an estimation of the imine ring content by reaction with $Na_2S_2O_3$, which has been reported (8) as a semiquantitative method for the estimation of imine ring content according to the following reaction:

$$\overline{RNCH_2CH_2} + Na_2S_2O_3 + H_2O \xrightarrow{\text{pH 5.2}} RNHCH_2CH_2S_2O_3Na + NaOH$$

The results listed in Figure 2 suggest that the change in absorpton at 12.3 microns is due to the opening of the imine ring.

The polymerization of a ring compound usually proceeds by an interchange reaction, induced either catalytically or by the presence of small amounts of end-group-producing substances. For example, water accelerates the polymerization of ϵ-caprolactam by hydrolysis of some of the compound followed by an interchange reaction.

$$\overline{CO(CH_2)_5NH} + H_2O \longrightarrow HOCO(CH_2)_5NH_2 + \text{lactam} \longrightarrow HOCO(CH_2)_5NHCO(CH_2)_5NH_2$$

Ethylene oxide polymerization may be initiated by alcohols, amines, and mercaptans capable of generating a hydroxyl group through reaction with the monomer (4). In the presence of strongly acidic or basic catalysts, successive addition of ethylene oxide molecules proceeds rapidly in the following manner:

$$\overline{CH_2CH_2O} + H^+ \longrightarrow HOCH_2CH_2^+ + \overline{CH_2CH_2O} \longrightarrow HOCH_2CH_2OCH_2CH_2^+$$

Polymerization of cyclic compounds may also occur by ionic mechanisms under the influence of strong acids and in the absence of water and alcohol. Thus, in the presence of a strong acid or electron acceptor, ethylene oxide may polymerize violently.

From this it would be expected that compounds capable of attacking the nitrogen of APO would initiate polymerization such as a) alkylating agents capable of forming quaternary nitrogen compounds, b) acids, c) oxidizing agents, d) amines, e) inorganic salts, and f) Lewis acids. Compounds representing these various types were included in the screening.

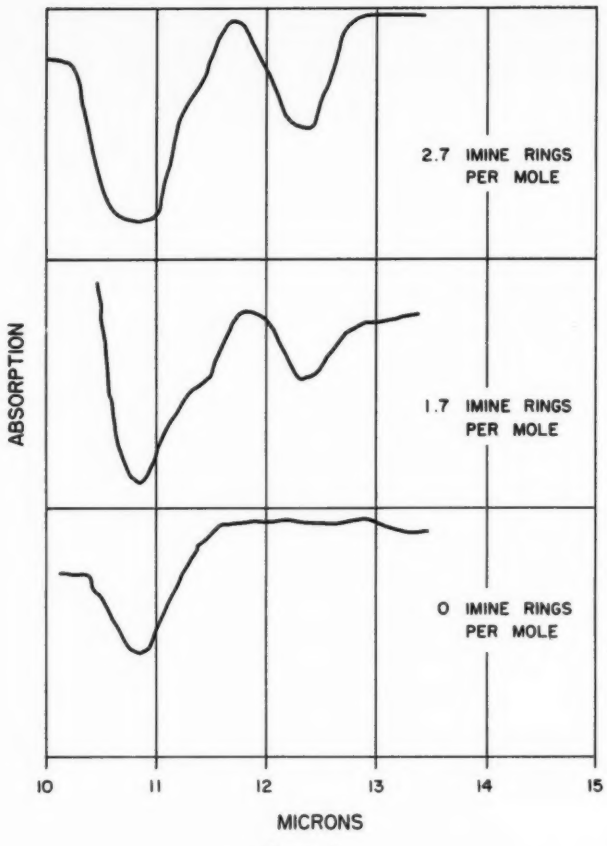

Figure 2
Absorption spectra of tris-1-aziridinyl phosphine oxide between 10 and 13 microns and the imine rings per mole as estimated by reaction with sodium thiosulfate

EXPERIMENTAL

The compounds being screened as catalysts were applied in combination with APO to a viscose film which was dried at 212°F for five minutes and then cured at 285°F for five minutes. Infrared spectra of the treated films were obtained. (Disappearance of the absorption at 12.3 microns was used as the criterion for curing.) The following compounds were not catalysts for the polymerization of APO under the above conditions: boron trifluoride, diethylene triamine, ethylene diamine, hydrogen peroxide, methyl iodide, Monsanto catalyst AC, 2-amino-5-nitrobenzene sulfonic acid, phenol, succinic acid, boron trifluoride-triethanolamine complex. Table I lists the compounds which were found to be effective catalysts for APO under these conditions.

TRIS-1-AZIRIDINYL PHOSPHINE OXIDE——A commercial product (3), an ethanol solution of APO, was used. Results of elemental analysis after removal of ethanol are

TABLE I
Catalysts for the polymerization of tris-1-aziridinyl phosphine oxide showing the lowest effective concentration (%)

	2	4	5	6	8	10	15
Oxalic acid					x		
Sulphonic acid			x				
Formic acid			x				
Sulfuric acid			x				
Phosphoric acid					x		
Hypophosphorus acid				x			
Phenol disulfonic acid	x						
Zinc perfluoborate (9)	x						
Ammonium chloride							x
Diammonium phosphate	x						
Urea phosphate						x	

TABLE II

Effect of varying bath concentrations of APO and DAP on flame resistance of 8.5-oz sateen

	5% APO 5% DAP	5% APO 10% DAP	10% APO 5% DAP	10% APO 10% DAP	15% APO 2½% DAP	15% APO 5% DAP	15% APO 10% DAP	15% APO 15% DAP
Wet pickup (%)	63.0	64.6	66.0	65.5	63.0	63.5	68.3	66.0
Resin add-on (dry weight)	4.4	6.7	7.0	10.5	7.6	10.5	14.8	13.7
Initial	0-1-5.9*	0-1-4.9	0-1-4.9	0-1-3.9	0-1-4.2	0-1-3.8	0-1-3.9	0-1-2.7
Laundered:								
one cycle	BE**	BE	0-1-4.4	0-1-5.0	0-2-4.7	0-1-3.9	0-1-4.0	0-1.7-3.1
three cycles	BE	BE	0-1-4.3	2-1-5.3	0-1.3-4.5	0-1-3.8	0-1-4.4	0-1.1-4.0
six cycles	—	—	4-0-7.8	BE	0-1.2-5.3	0-1-4.5	0-1-4.7	0-1.1-4.3
nine cycles	—	—	BE	0-1-4.7	0-1.2-5.0	0-1-4.5	0-1-4.7	0-1.4-4.1
12 cycles	—	—	BE	4-1-5.8	0-2.1-6.0	0-1-4.4	0-1-4.4	0-1.0-4.0
15 cycles	—	—	—	BE	0-1.2-4.3	0-1-4.4	0-1.7-4.4	0-1.2-3.7

*Vertical Bunsen—Method 5902 (*10*) (afterflame (sec), char length (in))
**BE—Burned to end

as follows: Calculated % C 41.6, Found 40.4; % H 6.99, Found 6.97; % N (Dumas) 24.36, Found 21.9; % P 17.9, Found 16.1.

Infrared spectra measurements were made with a Baird spectrophotometer. The sample was either ground into a K Br pellet (*5,6*) or run between two K Br pellets, 0.2 mm thick and 1.31 cm in diameter. A pellet holder (*2*) was constructed to hold the two K Br pellets together.

PREPARATION OF FILMS——Unplasticized cellophane film was immersed in a 20% aqueous solution of tris-1-aziridinyl phosphine oxide containing from one to 15% of the catalyst being studied. Catalyst concentration was based on the resin solids content of the solution. Small samples of the cellulose film were allowed to stand in the solution for 30 minutes at room temperature to insure complete saturation. At the end of this period they were removed and blotted dry to remove the excess solution. Drying was accomplished by hanging the treated films in a circulating air oven for five minutes at 212°F. Curing was done in the same manner at 285°F for five minutes. Immediately after the samples were cured, the spectra of the films were obtained on a Baird spectrophotometer using an untreated film in the reference beam. (See Figure 1).

$Na_2S_2O_3$ TITRATION——A 1:3 molar ratio of APO to $Na_2S_2O_3$ was placed in a beaker containing 50 ml of water. While measuring the pH of the solution continuously, 0.1 *N* HCl was added until a pH of 5.2 was reached. The pH was maintained at this point until a constant reading was obtained. The solution was then allowed to stand for 30 minutes and the excess $Na_2S_2O_3$ was titrated with 0.1 *N* iodine using starch as an indicator.

The screening technique was followed first by laboratory and then by plant applications to a cotton fabric. Of the catalysts listed in Table I, diammonium phosphate has several advantages. It is among those that are effective in small amounts, it also has advantages of low cost and ease of handling. In addition, it is a flame retardant itself. For these reasons, diammonium phosphate was chosen for these trials.

TABLE III

Strength and flame resistance of Cloth, Cotton, Sateen, 8.5-oz, DAPO treated (18.2% APO—5% DAP bath)

		Tear strength (wxf)	Flame tests AF	AG	CL	% P
Untreated		10.4 × 8.2				
Treated	Initial	4.9 × 3.6	0	1.2	3.8	
	Laundered—one cycle	4.7 × 3.8	0	1.4	4.0	2.24
	three cycles	4.2 × 3.1	0	1.4	4.5	
	six cycles	4.6 × 3.8	0	1.4	4.7	
	nine cycles	4.2 × 3.5	0	1.3	4.7	
	12 cycles	4.4 × 3.3	0	1.3	4.7	
	15 cycles	4.1 × 3.8	0	1.2	5.0	

The first trials, made on a laboratory padder (Butterworth three-roll pad), consisted of varying the bath concentration of APO and the diammonium phosphate. Pad liquor was made up to contain 5%, 10% and 15% APO. The catalyst concentrations for each of these baths ranged from 2½ to 15%; 0.3% Triton X-100 was used as a wetting agent. An 8.5-oz cotton sateen, nine inches wide, was given two dips, two nips, dried at 212°F for five minutes and cured at 300°F for five minutes.

Included in the trials was a bath containing 50% APO without any catalyst. The sateen fabric padded through this bath was dried for 15 minutes at 212°F and cured for five minutes at 300°F. This fabric after curing was not flame resistant.

Flame-resistance tests for the fabrics padded through the various concentrations of APO and DAP are shown in Table II. These results show that the diammonium phosphate is a catalyst for the curing of APO on the fabric as well as in the screening technique. Baths containing less than 15% APO did not fix sufficient resin on the fabric for flame resistance durable to laundering. With a bath containing 15% APO, the catalyst was effective from the 2½% level to the 15% DAP as shown by the durability of the flame resistance to laundering.

Pilot-plant applications were made on QM equipment which consisted of a Gessner two-bowl padder, a pin tenter inclosed with a flue-type drying oven and a curing oven. Finishing procedures were not continuous and the fabric was batched up after each operation. Since the equipment had only one squeeze pressure, the wet pickup could not be varied.

Higher wet pickups in the range of 70% were obtained on coating-type equipment having adjustable squeeze rolls.

Fifty yards of Cloth, Sateen 8.5-oz (Mil-C-12095) was padded through a bath containing 5% diammonium phosphate and 18.2% APO in the following bath formulation:

4.25 lbs	diammonium phosphate
21.25	Imine IP (based on 73% solids)
0.4	Triton X-100
59.1	water
Total 85 lbs	(10 gal)

The wet pickup was 75%. The fabric was dried at 250°F for two minutes and cured at 300°F for five minutes. Table III lists the performance test results for this fabric.

With the equipment that gave a lower wet pick-up, ie, 55%, the finish was applied in a two-pass process. The first pass was through a bath containing 15% APO and 10% DAP. After drying and curing, the fabric was passed through a bath contain-

TABLE IV
Strength and flame resistance of Cloth, Cotton, Sateen, 8.5-oz, DAPO (10% add-on)

		Tear strength (wxf)	Crease resistance (w + f)	Flame tests AF	AG	CL	% P
Untreated		10.4 × 8.2	108				
Treated	Initial	5.2 × 4.3	249	0	1.2	3.9	
	Laundered—one cycle	6.7 × 5.4		0	1	4.3	1.8
	three cycles	6.9 × 6.1		0	1	4.9	
	six cycles	6.1 × 5.9		0	1	4.6	
	nine cycles	5.9 × 5.7		0	1	4.8	
	12 cycles	6.3 × 6.2		0	1	4.7	
	15 cycles	5.5 × 5.4		0	2	4.9	1.5

ing 8.75% APO and 7% DAP. The fabric was again dried at 250°F for two minutes and cured at 300°F for five minutes. Table IV lists the performance test results for this fabric, including crease resistance by Method 5212 (*10*).

In making up baths of APO and DAP it was noted that, above certain concentrations, the bath separated into immiscible layers. It was found that, whenever the bath solids content exceeded 30%, separation would take place regardless of the combination of DAP or APO used. This of course does not include APO by itself or DAP by itself but refers only to combinations of APO and DAP that total 30% solids. It was also noted that when Triton X-100 was used as a wetting agent it had a tendency to settle out in the bath.

DISCUSSION

It appears that compounds other than THPC can be used in combination with APO as a durable flame retardant. An example is the DAPO combination. It has been shown that durable flame resistance can be obtained with this combination. It has several advantages over the APO-THPC combination. One is a reduction in cost of approximately 20%. Another is that there is no release of formaldehyde fumes in the pad bath, drying oven or curing oven. This makes DAPO a more acceptable formulation from a plant application standpoint, particularly where ventilation is limited. There is also some evidence that the bath stability of DAPO is greater than APO-THPC. Samples taken from an APO-THPC bath at room temperature polymerize into a solid on standing overnight. Samples of DAPO bath have stood for at least two weeks without visual evidence of polymerization. Effect on physical propertes has not yet been established for DAPO. This point is currently being investigated.

This paper gives one example of a compound that can be used to replace THPC in the APO-THPC formulation. It also suggests the general properties that such compounds should possess, such as a) that they be catalysts for the polymerization of APO, b) that they be flame retardants, and c) that they are capable of reacting with APO or cotton. From a comparison of APO-THPC with DAPO, it is probable that each combination will differ in its characteristics.

CONCLUSIONS

Compounds other than THPC can be combined with APO as a durable flame retardant for cotton. One of the properties of such compounds is their abilty to catalyze the polymerization of APO. An infrared method for screening candidate catalysts is described. Using one of these catalysts, diammonium phosphate, a new durable flame retardant for cotton textiles is described. The finish is a combination of APO and diammonium phosphate. This combination has advantage over existing APO finishes such as a reduction in cost of materials, ease of handling in a finishing plant (since no offensive fumes are given off) and greater bath stability.

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ABSTRACT

The Selection of Carriers for Dyeing Polyester Fabrics

Martin, F, *Can Textile J 77*, 49-50, April 29, 1960

Ten years ago only a few carriers were considered suitable for use in dyeing polyester fibers. Today, however, the chemical suppliers offer a dozen or more accelerants, and the chemist or dyer must decide between the relative merits of various carriers in order to make the best selection.

The author studied the effect on the lightfastness of a disperse red dye of four different carriers, representing the following types: phenols, phenol derivatives, chlorinated hydrocarbons, and aromatic esters. All four carriers were found to increase the fading. When the dyeings were given an alkaline scour (to remove residual carrier), the dyeings with a chlorinated hydrocarbon and an aromatic ester showed only slight fading on exposure; those with phenol carriers were not improved.

By heat-setting the dyed fabrics, however, practically all the carriers were removed, and all four dyeings showed marked improvement in lightfastness.

Another important characteristic of carriers is their ability to level unevenly dyed material. Tests made with two disperse red dyes showed that the phenols had good leveling effect, while the chlorinated hydrocarbons and aromatic esters were poor in this respect.

Tests were made to determine the relative efficiency of the four carriers throughout the entire dyeing cycle (ie, the effect of volatilization of the carrier out of the dye solution). The phenols again showed the best results.

Dyeings made of the two disperse red dyes with the four carriers all stained wool fibers (in blends of Dacron/wool). Evidently none of the carriers prevented the wool from being stained.

The author concludes: there are, of course, other properties required in a carrier, such as freedom from carrier spotting, efficiency at low temperatures, and no harmful effects on other fibers. It is, however, already obvious from the four tests described, he says, that the selection of a carrier will at best be a compromise, and probably the very best accelerant to use is simply high temperatures.

Proceedings of the
American Association of Textile Chemists and Colorists

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August 22, 1960 No. 17

Metropolitan Section——

DYEING BEHAVIOR OF DISPERSE DYES ON HYDROPHOBIC FIBERS*

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The newer concepts of theory and application of disperse dyes as applied to cellulose triacetate and polyethylene terephthalate fibers are discussed in light of

1) the mechanism of dyeing with disperse dyes,
2) factors which affect exhaustion of dyes of varying structure,
3) the physical nature of the hydrophobic fiber responsible for the slow diffusion rate,
4) the relation of shape, size and polarity of dye molecules to the dyeing of specific fibers,
5) the particle size behavior of disperse dyes during dyeing cycle, and
6) aspects of carrier action which contribute to dynamics of dyeing.

Data are presented to show that the properties sought in dyes for optimum dyeing behavior are 1) high saturation value for the specific fiber, 2) good diffusion rate, 3) low tendency to crystal growth in dyebath, and 4) balanced water solubility.

INTRODUCTION

THE past ten years have witnessed changes in the structure of disperse dyes used and in the dyeing processes used. These have resulted from the

1) demand by the educated consumer for higher fastness properties,
2) use of disperse dyes for the difficult-to-dye hydrophobic fibers, and
3) emphasis on reduction in dyeing costs based on need for maximum color value from more expensive dyes and shorter dyeing time.

Also contributing to the need for improved dyeing processes are the staining properties of disperse dyes on wool and cotton in their blends with hydrophobic fibers.

Although dyeing of cellulose acetate with disperse dyes has been practiced since 1922, the principles of dyeing have been established comparatively recently. These have been summarized by Bird et al (*1*) and Majury (*2*) on cellulose acetate. These principles have been applied to Arnel triacetate by Fortess and Salvin (*3*) and to polyethylene terephthalate by Schuler and Remington (*4*).

The newer concepts of theory and application of disperse dyes as applied to the more difficult to dye hydrophobic fibers will be discussed under the following headings:

1) the mechanism of dyeing with disperse dyes,
2) factors which affect exhaustion of dyes of varying structure,
3) the physical nature of the hydrophobic fiber responsible for the slow diffusion rate,
4) the relation of shape, size and polarity of dye molecules to dyeing of specific fibers,
5) the crystallization properties of disperse dyes during dyeing cycle, and
6) aspects of carrier action which contribute to dynamics of dyeing.

MECHANISM OF DYEING WITH DISPERSE DYES

The dyeing of the more hydrophobic fibers follows the same principles as used for these dyes on cellulose acetate. Dyeing takes place only if the requirement of solubility of the dye in the fiber is met. Wool is dyed by salt formation between dye ions and fiber. Cellulosic fibers absorb the direct dyes by intermolecular association. However, disperse dyes are essentially free of ionic groups. They are of a very low order of water solubility generally ranging from five to 100 mg/liter. The dye is largely present in the dyebath as a water dispersion with a particle size of one to two microns.

The mechanism involves adsorption of the dye from its water solution. Experiments carried out by Bird et al on acetate and by Schuler and Remington for polyethylene terephthalate show for most dyes a simple relationship, ie, the concentration of the dye on the fiber is proportional to the concentration in the dyebath. The relation is expressed as the partition coefficient and the behavior substantiates that of the solution theory.

$$\frac{\text{Dye on fiber}}{\text{Dye on dyebath}} = K$$

This relationship between solubility in the fiber and solubility in the dyebath is shown in Table I, based on recent data published by Bird and coworkers (*1,5*). The saturation values given are for dye free of dispersing agent. The dyes are of the established conventional type and are generally of simpler structure than those required for cellulose triacetate and polyester fibers. The partition coefficient shows that those dyes of highest water solubility show lower exhaustion on acetate. This relation, however, is not ideal and here the

*Presented before the Metropolitan Section at Kohler's Swiss Chalet, Rochelle Park, NJ, on March 18, 1960.

TABLE I

Saturation values, water solubility and partition coefficient of disperse dyes at 80°C on cellulose acetate

AZO	Solubility in H_2O mg/liter	Solubility in acetate gr/100	Partition coefficient
4-Nitroaniline— diethylaniline	0.2	.24	12000
4-Nitroaniline— N-ethyl-N-B-hydroxy-ethylaniline	7.7	1.9	2500
4-Nitroaniline— N N-bis-B-hydroxy-ethylaniline	26.4	1.0	380
2-Chloro-4-nitroaniline— N-ethyl-N-B-hydroxyethylaniline	4.0	2.5	6100
2-Chloro-4-nitroaniline— N N-bis-B-hydroxyethyl-m-toluidene	9.4	2.4	2600
2:6-Dichloro-4-nitroaniline— N N-bis-B-hydroxyethyl-m-toluidine	15.7	4.0	2520
2-Methoxy-4-nitroaniline— N N-bis-B-hydroxyethylaniline	230.0	7.7	340
ANTHRAQUINONOID			
1:4-Bismethylaminoanthraquinone	2.0	.34	1700
1-Methylaminoanthraquinone	6.1	.86	1400
1-Amino-4-hydroxyanthraquinone	11.7	1.1	910
1:4-Diamino-2-methoxyanthraquinone	16.0	1.8	1100
1:4-Diaminoanthraquinone	21.7	1.2	560
1-Methylamino-4-B-hydroxyethylamino-anthraquinone	30.3	1.33	440
1:4-Bis-B-hydroxyethylaminoanthraquinone	36.6	.80	180
1-B-Hydroxyethylaminoanthraquinone	50.5	2.4	500

TABLE II

Relative diffusion rate—disperse dyes

Fiber	Dyeing temp (°C)	Relative diffusion rate — CI Disperse Orange 3	CI Disperse Red 15	CI Disperse Violet 1
Terylene	85	1	1	1
Terylene	100	48	34	31
Nylon	85	680	1000	450
Secondary acetate	85	460	286	452

TABLE III

Saturation value of dyes—disperse dyes

Fiber	Dyeing temp (°C)	Saturation value of dyes — CI Disperse Orange 3	CI Disperse Red 15	CI Disperse Violet 1
Terylene	85	4.1	12.0	4.4
Terylene	100	4.8	10.7	4.7
Nylon	85	2.0	4.4	4.9
Secondary acetate	85	5.1	11.2	8.3

TABLE IV

Dyeing rate and percent exhaustion at 80°C

2% CI Disperse Red 35
2% CI Disperse Red 15
2 g/l Tamol N
Liquor ratio 40:1

Time minutes	Secondary acetate — Exhaustion %	Secondary acetate — Equilibrium %	Triacetate — Exhaustion %	Triacetate — Equilibrium %
CI Disperse Red 35				
60	77	90.5	23	27
120	81.5	95 8	33	38.8
240	84.0	98.7	41.5	48.7
480	84.5	99.4	53.0	62.3
1800	84.6	—	80.0	94
180 hrs	—	—	81.0	100
CI Disperse Red 15				
60	85.5	90	69	72.6
120	89.5	94.1	75.5	79.5
240	92.5	97.5	82	86.3
480	92 0	—	—	—
108 hrs	—	—	94.5	100

TABLE V

Percent exhaustion and temperature

2% CI Disperse Red 35
2% CI Disperse Red 15
2 g/l Tamol N
Liquor ratio 40:1

Temperature	Secondary acetate — One hour	Secondary acetate — Two hours	Triacetate — One hour	Triacetate — Two hours
CI Disperse Red 35				
60°C	45	65	6	8.4
70°C	67	82	16	22.0
80°C	77	81.5	23	33
90°C	74.5	78.0	34	45.5
CI Disperse Red 15				
60°C	65.5	71.5	37.5	51.5
70°C	74.0	85.5	55.0	67
80°C	85.5	92.5	69	75.5
90°C	85.5	92.0	76	85.5

TABLE VI

Exhaustion of CI Disperse Red 35 on triacetate as a function of concentration at 80°C

Concentration (owf)	One hour	Four hours	108 hours
0.4	54 5	73	95
0.8	43.7	63.8	90
1.6	30.0	49.6	80
3.2	18.3	25	71.6
5.0	10.6	17.2	61.2

effect of affinity enters as an additional factor. This increased pick-up by the fiber due to activated adsorption involves a more critical treatment of the solution theory.

APPLICATION OF THEORY OF DISPERSE DYEING TO TRIACETATE

Disperse dyes on cellulose triacetate (Arnel) exhibit a slower dyeing rate than on secondary acetate. The triacetate fiber is practically free of hydroxy groups. It does not possess the aromatic ester structure of the polyester fibers—derived from terephthalic acid. It is more hydrophobic than secondary acetate and will absorb 9% water in dyeing whereas polyethylene terephthalate water absorption approximates 1% and secondary acetate absorbs 16%.

A comparison of the triacetate and the secondary acetate with respect to partition coefficient, rate of exhaustion and diffusion rate represents a direct comparison between fibers of closely related chemical nature yet differing in hydrophobicity.

Tables II and III summarize differences in diffusion rate and saturation for disperse dye between secondary acetate and polyester (*6*). It is useful to define the terms used in characterization of the dyeing systems.

The partition coefficient is the distribution of dye between fiber and the dyebath at the end of an equilibrium dyeing. It reperesents what is thermodynamically possible. For a specific dye and fiber, it is characterтribution of dye between fiber and surfactant. It may require ten minutes for one dye and 100 hours for another to reach this equilibrium percent exhaustion.

Rate of exhaustion is a matter of kinetics and is the speed at which the dyeing system moves towards its equilibrium exhaustion. A useful value is the half dyeing time which can vary in the case of commercial disperse dyes on secondary acetate from three minutes to 30 minutes. It is dependent on the diffusion rate.

Affinity is measured by the electrical forces, such as hydrogen bonding, etc, which bind the dye to the fiber. In the reversible system of disperse dyeing, these forces are responsible for adsorption on the fiber. They must be released for desorption and for further migration of dye within the fiber. These affinities of a specific fiber are basic to the dynamics of disperse dyeing. The structure of the dye with its functional groups available for bonding as well as the geometry of the dye molecule are the factors effective here.

Saturation is the capacity for max-

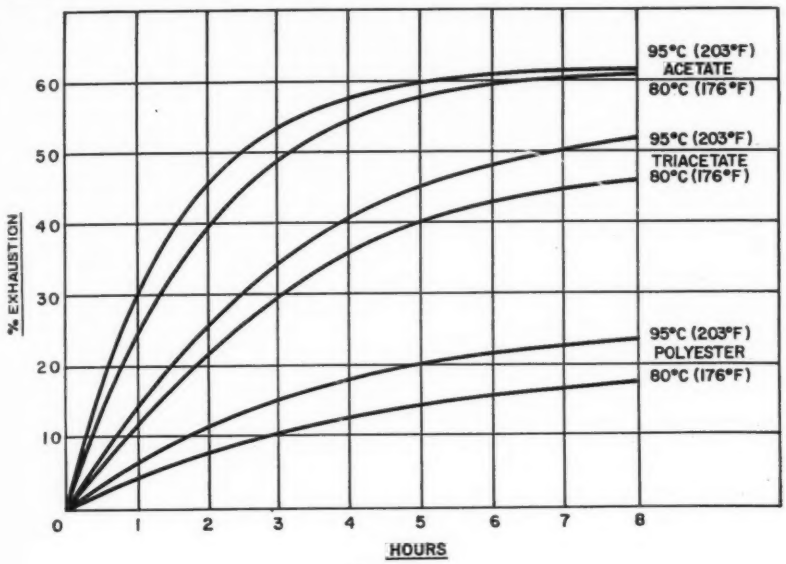


Figure 1
Relative dyeing rates of acetate, triacetate and polyester fibers with 2% CI Disperse Blue 27 at 50:1 liquor ratio

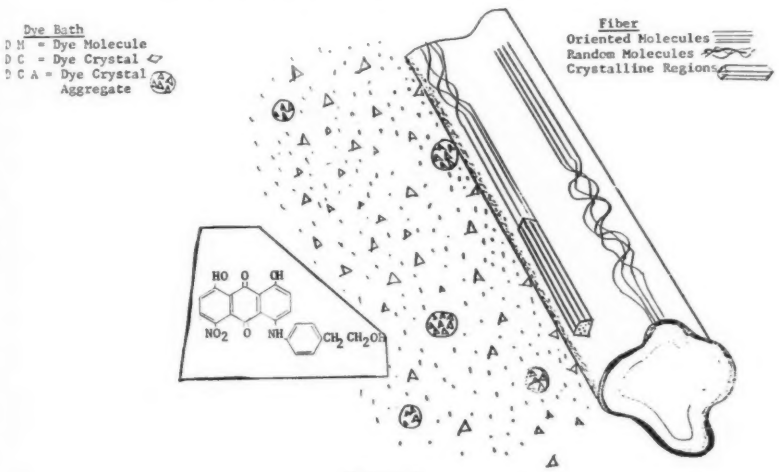


Figure 2
Diagrammatic representation of dyeing hydrophobic fiber with nonionic dyes

imum absorption of dye and is taken to be the solubility of dye in the specific fiber.

EXPERIMENTAL

The principles of partition coefficient and exhaustion rates were examined in a series of dyeings on cellulose triacetate. In these experiments, two dyes were used: CI Disperse Red 15 (1-amino-4-hydroxy anthraquinone), a conventional dye of rapid dyeing rate, and CI Disperse Red 35 (5-nitro-2-aminophenylmethylsulfone → N-Difluoroethyl-N-ethylaniline), an azo red of slow dyeing rate. Comparison was made with secondary acetate.

Dyeing conditions were at liquor ratio of 40:1 and in the presence of 2 g/l of an anionic surfactant, Tamol N, a stable formaldehyde naphthalene sulfonic acid. Percent exhaustion at 80°C is shown as a function of time in Table IV. Exhaustion as a function of temperature is shown in Table V for two-hour dyeings. Exhaustion as a function of concentration is shown in Table VI for two-hour dyeings.

The data illustrate several points:

1) With dyes of fairly high water solubility and especially in the presence of surfactants which increase water solubility, exhaustion level at practical dyeing times will fall off with dyebath temperature increase.
2) Higher temperatures are required even for secondary acetate where such dyes of slower diffusion rate as CI Disperse Red 35 are used. The requirement of higher temperature for greater exhaustion becomes compounded where a less dyeable fiber and slow diffusing dye is used.
3) Partition coefficent for dye is essentially the same for both secondary acetate and triacetate. It must be pointed out that partition coefficient can change with temperature and will be dependent on the competing influences of solubility in the fiber and greater solubility in dyebath at higher dyeing temperatures.
4) Triacetate is a more readily dyeable fiber than polyester. This difference is shown in Figure 1.
5) The problems of dyeing rate to give good exhaustion are most critical in heavier depths. Here the outer layer is dyed to the saturation level for the specific dye. No further dye pickup is possible until inward diffusion occurs thereby permitting more dye pickup. The function of high temperatures in dyeing as well as the use of carriers is to increase the diffusion away from the surface.
6) The microscopic cross sections of dyed fibers show ring dyeing of cellulose triacetate where CI Disperse Red 35 is used. These visible manifestations of diffusion rate clearly establish the importance of degree of penetration.

DYNAMICS OF DYEING

The slower dyeing rate of disperse dyes on hydrophobic fiber is due to two reasons: 1) the submicroscopic structure of the fiber limits accessibility of dye liquor, and 2) the dye molecules are adsorbed but do not desorb to liberate points of attachment for fresh dye molecules. Both conditions must be overcome for increase in diffusion rate.

ACCESSIBILITY —— As shown in Figure 2, the structure of the fiber is that of a bundle of long molecules. These molecules are attracted to each other by electrical forces including

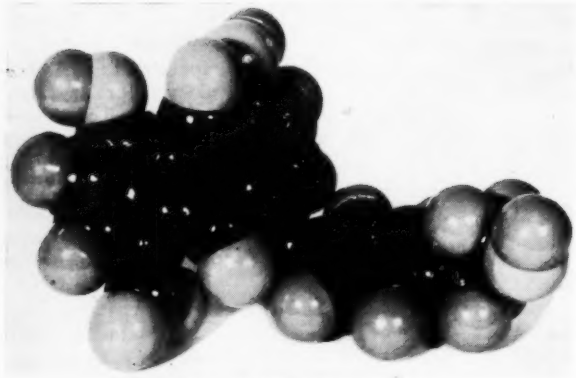


Figure 3
Molecular model of CI Disperse Blue 27

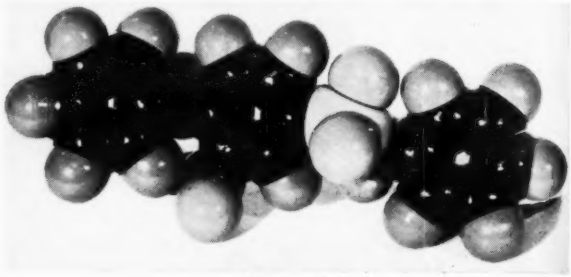


Figure 4
Molecular model of CI Disperse Yellow 37

hydrogen bonding, which gives them a compact structure. There are regions where the segments are arranged parallel to each other in a well-ordered lattice termed crystalline regions. There are also areas where there is less organization of the fiber molecules. It is is in these latter regions, termed amorphous, that penetration of dye liquor occurs and forces are available to hold the dye molecule.

The three-dimensional structure of the hydrophobic fiber is that of a honeycomb. The amorphous regions can be thought of as a system of interlocking fiber segments with pores between them. These pores, however, are not fixed. They are the result of thermal motion of chain segments—the section of a chain between two consecutive intermolecular bonds. The shorter the segments the smaller the maximum amplitude of these vibrations and, therefore, the smaller the diameter of the pores.

Increase in temperature raises the frequency of vibrations of the fiber molecules as well as the amplitude. The spaces between the molecules open with greater frequency and to greater size. Since dye diffusion is through these spaces and is dependent on their availability, diffusion rate increases with temperature.

Swelling treatments push apart the fiber molecules, reducing the number of bonds between the macromolecules, thereby increasing the length of the segments. The longer segments will have larger amplitudes during vibration permitting formation of larger pores.

MOBILITY OF DYE

The dynamics of disperse dyeing also involve activation of the dye. Dyeing takes place from water solution of dye. Only single molecules of dye penetrate the spaces between the long molecular fiber chains. Effects of higher temperature include deaggregation of the dye, increase in availability through increase in water solubility, and in higher mobility of the dye in its water solution. However, comparatively little is known of the forces by which the dye is adsorbed onto the fiber.

These forces of attraction giving linkage between dye and fiber are not ionic forces but are the short range electrical forces, ie, hydrogen bonding, dipole interaction, Van der Waals forces. Majury (2) has noted the strength of these forces in his work on affinities of disperse dyes on acetate and triacetate. Glenz, Beckmann and Wunder (7) have examined a number of structures on polyester fiber and suggested a correlation between hydrogen bonding of dye with fiber and diffusion rates. The number, position and orientation of these short range forces on the dye and their registration with the attractive groups on the fiber determine the strength with which the dye is held by the fiber.

The size, the shape and the polar forces on the dye must be considered. Increase in size as obtained with mass of high molecular weight or bulky molecules with long side chains which approach the pore size of the openings, tend to give sluggish moving dyes as compared to low molecular weight dyes of compact planar structure.

Moreover, dyes of complicated structure made to obtain improved properties of fastness to light, sublimation, wash or atmospheric fading possess hydrogen bonding groups which can attach themselves to the various attractive forces on the fiber.

For the diffusion to take place, dyes must travel into the virgin areas of the fiber by loosening their linkage to the fiber and penetrating further.

A series of dyes of varying molecular weight and geometric dimensions was examined from the standpoint of penetration into the cross section of cellulose triacetate. Dyeing conditions were one hour at 90°C in absence of carriers using 2% of disperse dye on fiber weight. The desorption values were obtained by conditions of #3 AATCC wash test, ie, 45 minutes at 160°F. Spectrophotometric values on the fiber before and after washing as well as on the wash liquor gave the percent desorption. Molecular models were made of individual dyes and size and shape of the dye molecule established in qualitative fashion. Correlations are shown in Table VII.

CI Disperse Violet 1 (1-4-diamino anthraquinone) is a compact structure. Its amino groups are associa-

TABLE VII
Relation of size and shape of dye molecule to diffusion rates

Dye	*Mol wt*	*Geometric shape*	*Radial penetration*	*Desorption at 160°F*
CI Disperse Violet 1	238	Small size Compact	70	28
CI Disperse Blue 3	296	Intermediate size Side chains	40	13
CI Disperse Blue 27	412	Bulky Side chains	20	5
CI Disperse Yellow 33	293	Short Planar	80	35
CI Disperse Yellow 37	371	Long Planar	25	6
CI Disperse Red 1	314	Side chains Planar	50	12
CI Disperse Red 35	410	Bulky Side chains	25	9
CI Disperse Red 15	239	Small size Compact	75	32

ted with quinone groups of the anthraquinone. The probability of forming strong bonds with ester groups of cellulose triacetate is low. Its behavior is that of an easy-dyeing, easily desorbed, deep-penetrating dye.

CI Disperse Blue 3 (1-methylamino-4-ethanolamino anthraquinone) contains alkyl side chains. Molecular models show bulkier molecules in shape. The hydroxyl group is spatially free to interact with attractive forces on the fiber. The dye is intermediate in its desorption and penetration.

CI Disperse Blue 27 (1-5-dihydroxy-4-arylamino-5-nitroanthraquinone) is shown by its molecular model, Figure 3, to have bulkiest molecule. It contains nitro and phenolic for hydrogen bonding, etc, with fiber molecules. As might be expected, it is of slow penetration and exhibits least desorption of the three blues.

Similar correlations between molecular weight, geometry of the molecule and potential for forming stronger affinity bonds can be drawn for the two prototype yellows, CI Disperse Yellow 33 (2-nitro-4-sulfon(amide)diphenylamine) and CI Disperse Yellow 37 (2-nitro-4-sulfonanilido diphenylamine). (See Fig 4). Disperse Red 1 and CI Disperse Red 35 are azoic dyes. The 4-nitroaniline → N-ethyl-B-hydoxyethylaniline is a simpler molecule than the Red 35 (5-nitro-2-aminophenylmethylsulfone → N-difluoroethyl ethyl aniline). CI Disperse Red 15 (1-amino-4-hydroxyanthraquinone) is of the same compact structure as CI Disperse Violet 1 and exhibits the same dyeing behavior.

SPECIFICITY OF DYES FOR HYDROPHOBIC FIBERS

The phenomena of dyeing behavior exhibited on cellulose triacetate is generally duplicated on polyester fiber — polyethylene terephthalate. However, there have been found a number of structures which show specificity for the polyester fiber. The structures and their properties throw additional light on disperse dye behavior. Salvin, Walker and Adams (*8*) synthesized and evaluated dyeing properties on both cellulose triacetate and polyethylene terephthalate fibers of a range of anthraquinone blues and reds as well as diphenylamine yellows.

1) In the series of 1-hydroxy-4-arylaminoanthraquinone, dyes of hydrophilic structure, ie, containing alcohol groups on the arylamine as derived from meta amino benzyl alcohol, etc, favor the cellulose triacetate. Dyes of hydrophobic nature, eg, 1-hydroxy-4-anilino anthraguinone, favor polyester fiber. This is shown in competitive dyeings and in exhaustion and dyeing rate studies.
2) In the series of 1-5-dihydroxy-8-nitro-4-arylamino anthraquinones, which are variants of CI Disperse Blue 27, the hydrophobic anilino structure builds up well on polyester fiber but shows poor dyeing properties on cellulose triacetate. The m-amino phenyl methyl carbinol analog shows excellent dyeing properties on cellulose triacetate.
3) In the series of diphenylamine yellows, the more hydrophobic 2-nitrosulfonanilido diphenylamine, CI Disperse Yellow 37, was compared with a dye containing added hydroxyethyl groups. Here the structure free of hydrophilic side chains shows values on polyester closer to those obtained for cellulose triacetate.
4) A classic example of specificity is shown by 1-amino-2-brom-4-hydroxy anthraquinone (Latyl Red B). This dye has limited color value on cellulose triacetate, but on polyester it builds up to full shades.
5) As yet, the explanation of these cases of specificity is not complete. The principle of capacity can be used for the anthraquinone red (Latyl Red B). The saturation value on triacetate is low, 0.16 g/100g of fiber, whereas, on polyester the saturation value is 0.78 g/100.

The hypothesis offered by Glenz et al is that diffusion rate is hindered by tendency of alkyl hydroxyls to react by secondary electrical forces with aromatic ester groups. This hypothesis has been applied to a series of azo dyes comparing 4-nitro-2-6-chloraniline → N N dioxy ethyl meta chlor aniline with analog prepared from N N dimethyl meta chlor aniline. Further comparative data on saturation values, radial penetration of fiber and desorption is necessary for the anthraquinone blues described above.

DYEBATH STABILITY— CRYSTALLIZATION

A number of the conventional dye structures in the antraquinoid and azo groups which find use on cellulose triacetate are of little or no value for polyester fibers. Thus the 1-4 dialkyl amino anthraquinones are of exceptionally poor lightfastness. Many azo dyes which contain amine groups with passable lightfastness on acetate fibers are much lower in light on polyester fiber.

High temperatures of dyeing eliminate dyes unstable under pressure dyeing conditions. Staining problems on wool or cotton blends pose additional restrictions.

The properties sought for in dyes for optimum dyeing behavior are:

1) high saturation value for the specific fiber,
2) good diffusion rate,
3) low tendency to crystal growth in dyebath and
4) balanced water solubility

It is the tendency to crystal growth in the dyebath that plagues the dyer. This is shown in examples taken from work on anthraquinone reds and blues, Table VIII. The 1-amino-2-brom-4-hydroxy anthraquinone demonstrates the problem of particle size growth.

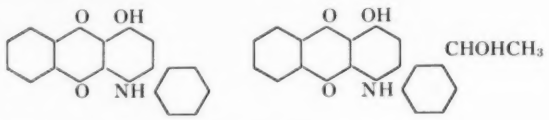
In triacetate dyeings, either in presence or absence of carriers, the initial fine dispersion of 2-4 microns at the dyeing temperature of 95°C changes to large crystals of 30-40 microns. Exhaustion of dye is poor and the race between crystal growth and exhaustion onto the fiber is plainly in favor of particle size growth. On polyester fiber, the dye builds up to full shades with little opportunity for particle growth.

Similar behavior is shown by the

TABLE VIII
Crystallization tendency of anthraquinone reds

Substituents *Anthraquinone reds*	*360°C, 10 sec sublimation*	*Crystallization tendency*
1-amino-4-hydroxy	1-2	none
1-amino-2-methyl-4-hydroxy	1-2	marked
1-amino-2-brom-4-hydroxy	2	moderate
1-amino-2-methoxy-4-hydroxy	3	none
1-amino-2-3-dichlor-4-hydroxy	2	marked
1-amino-2-S-CH_2CH_2OH-4-hydroxy	3	none
1-amino-2-$OCH_2CH_2OCH_3$-4-hydroxy	3	none

violet dye structure of good lightfastness on polyesters.



The anilide structure has significantly lower saturation value on triacetate as compared with polyester. It shows pronounced crystallization tendency in triacetate dyeings but is relatively free of it in polyester dyeings. Crocking, dye spots and solvent bleeding become problems in dyes of crystallization tendency, especially when dyeing rate is low.

The problem of higher lightfastness on polyester fiber is being met by anthraquinone blue dyes of 1-5-dihydroxy-8-nitro-4-arylamino anthraquinone. The tendency to crystallization in the dyebath which is most pronounced at higher temperatures is also a problem here. The aniline derivative shows poorer exhaustion on triacetate fiber but builds up well on polyester fiber. The analogs containing substituent alcohol groups show better dyebath stability. Use of isomeric mixture has been shown to give higher bath stability. (*8*).

ACCELERANT ACTION

The mechanism of carrier action is only reasonable if it increases the diffusion rate of the dye within the fiber. The concept that the carrier acts on the fiber rather than the dye has been shown to be sound in the evidence presented both in the 1959 Piedmont Intersectional Paper (*9*) on accelerant dyeing and in the paper by Rochas and Gourmont (*10*).

It is shown that a) carrier acts within fiber, b) if carrier is not absorbed there is no carrier action, and c) that factors that reduce carrier absorbance result in lower dyeing rates.

The theory of carrier action as loosening the fiber structure fits both dyeing mechanism and the requirement of increasing diffusion rate.

The structure of the hydrophobic fiber as a closely packed bundle of long fiber molecules forming a honeycomb structure has been presented. The effect of temperature in increasing number of "holes" or openings formed as segments of the molecules vibrate is not sufficient at temperatures below 100°C for polyester. The carrier is absorbed by the fiber. As the fiber molecules vibrate, the bonds between fiber molecules separate. The carriers now form fiber molecule-carrier bonds. The fiber carrier bonds are loose bonds and dissociate more easily under higher temperatures. The result is an increase in the number and size of holes formed as the fiber segments vibrate. The overall result is greater accessibility and the desired increase in diffusion rate of the dye.

With respect to dye mobility, the carrier is also held by the forces of the fiber. It is postulated that carrier molecules may displace dye molecules thereby increasing desorption rate necessary for diffusion away from surface of the fiber.

CORRELATION OF DYE EXHAUSTION WITH CARRIER CONCENTRATION IN FIBER——Absorption data was obtained in trials run on a laboratory jig with tripropyl phosphate at liquor ratios of 3:1 using 3% and 9% of active carrier on fabric weight at 95°C.

Dyeing trials were run on Arnel with 8% Eastman Polyester Blue BGLF on fabric weight using a) no accelerant, b) 3% tripropyl phosphate and 9% tripropyl phosphate. Dyed samples taken at intervals of one, two, and three hours gave both rate and exhaustion data. At end of dyeing, fabric was rinsed and actual tripropyl phosphate content determined by gravimetric analyses for phosphate. Fabric samples were given spectrophotometric analyses for content of dye.

Curves in Figure 5 show direct relation of carrier content within fiber to dye rate and exhaustion, eg, the greater the actual carrier present, the higher the exhaustion.

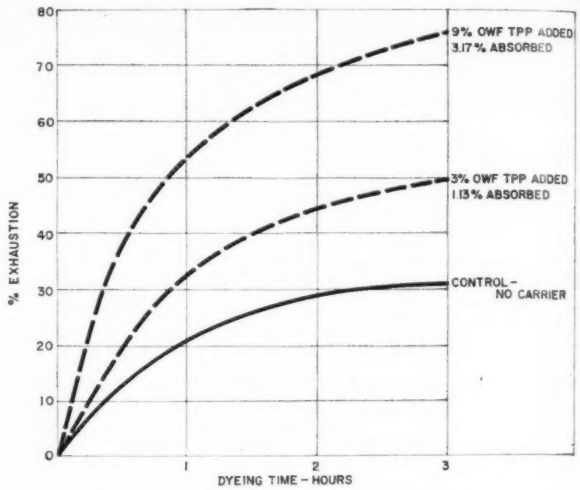


Figure 5
Relation of carrier absorption to dye exhaustion— 8% CI Disperse Blue 27 at 95°C

SUMMARY

1) The principles established for dyeing of disperse dyes on secondary acetate have been critically examined for cellulose triacetate. The solution theory holds and diffusion rate within the fiber is shown to be the rate controlling factor.
2) The kinetics of dyeing of hydrophobic fibers, including triacetate and polyethylene terephthalate, have been related both to changes in accessibility of fibers to dye and to mobility of dye. The attractive forces holding dye to fibers representing affinities are discussed as affecting diffusion rate.
3) The mechanism of carrier action is pointed out as one in which fiber is made more accessible through absorbed carrier by loosening of fiber bonds. This mechanism substitutes carrier activity for high temperatures required for diffusion.
4) The specificity of dyes for polyester fibers as against cellulose triacetate is shown. The hydrophobic nature of the dyes of superior dyeing properties on polyester suggests further work relating diffusion rate with capacity and Van Der Waals forces contributing to affinity.
5) At no time in the long history of disperse dyes has there been so much work being done on synthesis of new dyes and critical examination of their dyeing and

(*concluded on page 41*)

AATCC Committee on Bleaching (RA34)——

DETERMINATION OF NONCOTTON CONTENT OF BLEACHED COTTON TEXTILES

R P S BLACK

Chairman, Committee RA34

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J R Hopkins	

The accompanying revision of AATCC Tentative Test Method 80-1954, "Determining the Noncotton Content of Bleached Woven Cotton Cloth", having been balloted upon, now has the approval of the Technical Committee on Research as a Tentative Test Method.

The Committee on Bleaching ran innumerable comparative tests between the original test, the then proposed revision, and a similar test outlined in Federal Specification CCC-T-191b. It was the consensus of opinion that data obtained when using the revised procedure had much more meaning from a practical viewpoint than did corresponding data from either of the other two methods.

DETERMINATION OF NONCOTTON CONTENT OF BLEACHED COTTON TEXTILES

Tentative Test Method
97-1960

PURPOSE AND SCOPE——This method is intended for determining the amount of water-soluble material, starch size, oils, fats, waxes, and water-insoluble mineral matter in cotton yarn or fabric.

PRINCIPLE——Water- and enzyme-soluble materials are removed in that order by treatments in 1) hot water and 2) an amylase solution. Oils, fats and waxes are removed by extraction with trichlorethylene and finally, the specimen is burned so that residual ash may be determined.

APPARATUS AND MATERIALS
Analytical balance
Circulating air oven
Soxhlet extraction assembly
Muffle furnace
Weighing bottles with glass covers
300-ml tall-form beakers
100-mesh stainless-steel sieve
Desiccator with calcium chloride
Trichlorethylene, extraction grade
High-strength bacterial amylase

TEST SPECIMEN——A specimen weighing about 10 g is taken from the material to be analyzed. If the material is a woven fabric, the cut edges are folded inside the specimen to avoid loss of loose fibers or threads.

PROCEDURE——

a) *Drying Specimen.* The specimen is placed in a tared weighing bottle and dried overnight in the oven at 220°-230°F (105°-110°C), and then cooled in the desiccator. When cool, the specimen is weighed.*

b) *Water-Soluble Material.* The dried specimen is removed from the weighing bottle and placed in a 300-ml beaker containing 200 ml of distilled water. The beaker and its contents are heated to 180°F (82°C) for two hours. The water is then separated from the specimen by filtering with a Buchner funnel. The specimen is washed with two 25-ml portions of hot distilled water and partially dried by squeezing on the funnel. It is then replaced in the weighing bottle and redried. The difference in weight from step "a" is the water-soluble material. If desired, the aqueous filtrate can be titrated with 0.1*N* acid to determine the alkaline materials extracted.

c) *Enzyme-Extractable Material.* The specimen from "b" is removed from the weighing bottle and placed in a 300-ml beaker containing 200 ml of a 2% high-strength bacterial amylase solution. The beaker and its contents are heated to 160°-170°F (71°-77°C) for one hour. The contents of the beaker are then poured into the 100-mesh sieve and the fabric rinsed free of enzyme by washing with 10 successive 100-ml portions of hot distilled water. The specimen is again dried to determine the amount of material which has been extracted.

d) *Oils, Fats and Waxes.* The dry specimen from which water and enzyme extractables have been removed is placed in a fresh thimble in the Soxhlet extractor and extracted 12 to 16 times with trichlorethylene. The thimble is then removed from the extractor and the major part of the trichlorethylene remaining on the specimen is allowed to evaporate in a hood. The specimen is then removed from the thimble, placed in the weighing bottle and redried. The material extracted is determined by the loss in weight.

e) *Residual Ash.* The specimen from the trichlorethylene extraction is placed in a tared porcelain crucible, carefully charred with a Meeker burner and then ashed in a muffle furnace at 1112°-1202°F (600-650°C) (normally about 30 minutes). After complete removal of carbon, the crucible is cooled in the desiccator and weighed.

EVALUATION —— All values are reported to the nearest 0.1%, except those values less than 0.2% are reported as "less than 0.2%." Total noncotton content is the sum of these four values; those less than 0.2% are arbitrarily added in as 0.1%.

Normally all values reported are the average of duplicate determinations.

*It has been found that, with constant atmospheric conditions, this weight is reproducible to the nearest milligram. However, normal humidity variations will cause differences of as much as 0.01 gram for a specimen which is dried and weighed and then redried in the oven without any other treatment. This factor is the limit to the accuracy of the following steps.

AATCC Committee on Bleaching (RA34)———

DETERMINATION OF ALKALI IN BLEACH BATHS CONTAINING HYDROGEN PEROXIDE

R P S BLACK

Chairman, Committee RA34

The accompanying new test, "Determination of Alkali in Bleach Baths Containing Hydrogen Peroxide," having been balloted upon, now has the approval of the Technical Committee on Research as a Tentative Test Method.

Because of a variety of concentrations of sulfuric acid for testing the alkali content of bleach baths is being used, it was deemed advisable by the Committee on Bleaching to standardize on one method.

Uniformity throughout the trade, as far as this test is concerned, will be of great benefit to the bleacheries, since titrations of this nature are usually run by nonscientific personnel.

DETERMINATION OF ALKALI IN BLEACH BATHS CONTAINING HYDROGEN PEROXIDE

Tentative Test Method
98-1960

PURPOSE AND SCOPE———This method provides the means of determining the amount of alkali contained in bleach baths using hydrogen peroxide as the bleaching medium.

PRINCIPLE———A 10-ml aliquot of the bleach bath is titrated with 0.1*N* H_2SO_4 using phenol red as the indicator. The number of ml of acid used multiplied by 2.5 gives the alkali content expressed in pounds of sodium silicate (42° Bé, 10.5% Na_2O, corresponding approximately to the formula 2½ SiO_2 . Na_2O) contained in 100 gallons of bleach bath.

APPARATUS AND MATERIALS

Balance, analytical
Flask, volumetric, one-liter, 2
" " "
" Erlenmeyer, 250-ml
" " , two-liter
Burette, 50-ml
Pipette, 25-ml, volumetric
Cylinder, graduated, 500-ml
Bottles, flint-glass, screw caps
Sulfuric acid, CP (sp gr 1.84) (*1*)
Sodium hydroxide, CP (*1*)
Acid potassium phthalate (National Bureau of Standards standard sample No. 84)
Phenol red (phenol-sulfonphthalein)
Water, distilled
Methanol, synthetic

PROCEDURE———To about 20 ml of distilled water in a wide-mouth bottle, add a few drops of phenol red indicator and 10 ml of bleach bath. While shaking the bottle, run in the sulfuric acid from a burette, dropwise, until one drop suddenly changes the color of the solution from red to greenish yellow. Read the number of ml of the H_2SO_4 solution used.

CALCULATIONS———The number of ml of acid used multiplied by 2.5 gives the number of pounds of sodium silicate contained in each 100 gallons of bleach bath; for example, if five ml of acid is used, each 100 gallons of bleach bath contains 12.5 lbs of sodium silicate (42° Be′) or equivalent alkalinity.

PREPARATION OF 0.1*N* H_2SO_4

1) For each liter of solution, weigh 5.5 grams of CP sulfuric acid (sp gr 1.84). Add the acid to the proper amount of distilled water and stir well.

2) Prepare a solution of NaOH* containing 4.0 g/l which will be approximately 0.1*N*.

3) Make up a solution of acid potassium phthalate (National Bureau of Standards standard sample No. 84) containing exactly 20.4080 g/l. This solution is exactly 0.1000*N*.

4) Pipette exactly 25 ml of the acid potassium phthalate solution prepared in step 3 into a 250-ml Erlenmeyer flask. Add five drops of phenol red indicator solution (0.06% solution) and from a burette slowly add the sodium hydroxide solution prepared in step 2. Continue the addition until the pink end-point is reached.

5) Calculate the normality (*N*) of the NaOH solution as follows:

$$N\ (\text{NaOH}) = \frac{25(0.1000)}{\text{ml NaOH required}}$$

6) Pipette exactly 25 ml of the crude sulfuric acid solution prepared in step 1 into a 250-ml Erlenmeyer flask. Add five drops of phenol red indicator and titrate with the standardized NaOH solution.

7) Calculate the normality of the crude H_2SO_4 solution as follows:

$$N\ (H_2SO_4) = \frac{(\text{ml NaOH})\ (\text{N of NaOH})}{25}$$

The normality of the crude H_2SO_4 solution should be somewhat greater than 0.10. The number of ml of distilled water to be added per liter of crude solution to adjust the normality to 0.1000 may be calculated as follows:

$$\text{ml } H_2O/l = \frac{N\ (H_2SO_4) \times 1000}{0.1000} - 1000$$

8) Add the calculated amount of water, stir well, and determine the normality of the diluted solution as in steps 6 and 7. If the normality of the diluted solution is not 0.1000 ± 0.0002, it can be adjusted again as in steps 7 & 8.

9) Siphon the H_2SO_4 solution into suitable-size flint-glass bottles fitted with screw caps and label.

PREPARATION OF PHENOL RED INDICATOR———This indicator is an approximate 0.06% solution of phenol red (phenol sulfonphthalein) in 50% methanol by volume. Phenol red may be procured from the laboratory supply houses.

1) Weigh 1.00 gram of phenol red and dissolve completely in synthetic methanol.
2) Dilute to 833 ml with synthetic methanol and then add 833 ml of neutral distilled water. Shake until the solution is clear.

*When standardized NaOH solution is available, steps 2-5 are eliminated.

NOTE———
(*1*) Concentrated standardized solutions may be purchased from various laboratory supply houses. Their use is simple. Open the plastic container, pour into a volumetric container, rinse out plastic container and make up to volume.

Dyeing Behavior of Disperse Dyes on Hydrophobic Fibers

(*concluded from page 38*)

fastness properties as today. The progress of this work would benefit by attention to at least three areas:

a) The reasons for low lightfastness on polyester fibers of conventional blue anthraquinone and red azo dyes.

b) The relation between hydrophobicity of dye structures and their dyeing properties on triacetate and polyester fibers.

c) The physico-chemical principles underlying the advantageous use of dye mixtures.

ACKNOWLEDGMENT

The author is indebted to the management of the Celanese Corporation for permission to publish experimental data and to Fred Fortess for interest and support in writing the paper. Acknowledgment is also made to J R Adams, P Studer, and R A Walker for data used herein.

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COUNCIL TO MEET SEPT 9 IN ATLANTA

THE 220th meeting of the Council will be held September 9, 1960 at the Atlanta-Biltmore Hotel, Atlanta, Ga, at the invitation of the Southeastern Section. Council committees and research committees will meet the day previous and the morning of the 9th.

On September 10, the Technical Committee on Research will hold a special meeting in conjunction with the regular Southeastern Section meeting.

Elected to Membership

No designation after name indicates Senior
(A) indicates Associate
(J) indicates Junior
(S) indicates Student
* indicates transfer from another class of membership

JULY 27, 1960

NEW ENGLAND REGION

Northern New England Section

Francis J Cooley (A)

Rhode Island Section

Donald J McCauley

CENTRAL ATLANTIC REGION

Delaware Valley Section

J Lawrence Hallet Jr
Francis P Russell

Metropolitan Section

David Gliksmann
Samuel Stowell Jr
Fred B Johnson (A)
Herbert Settel (A)
*Peter Turner**

Niagara Frontier Section

*Louis Port**

SOUTHERN REGION

Piedmont Section

Thomas K Hancock
Helmuth H Prochaska
Jerry W Morris (J)

South Central Section

William D McCarrell
William H Hurley (J)

Southeastern Section

Wiley M Crittenden Jr

Washington Section

Francis W Minor
Sandra S Warsaw (J)
Bert E Fry Jr (A)

WESTERN REGION

Mid-West Section

*Joan L Mraz**

STUDENT CHAPTER

Georgia Institute of Technology

Carlos A Molina (S)

NON-AFFILIATED

Hans Herzog
Peter J Padvaiskas
*Javantkumar G Parikh**

AUGUST 11, 1960

NEW ENGLAND REGION

Northern New England Section

*Robert J Lippe**

Rhode Island Section

John G Erhardt Jr
Roy W Richards (A)

Western New England Section

Floyd E Colvin

CENTRAL ATLANTIC REGION

Delaware Valley Section

Leon F Horn
Andrew J Pintozzi (J)

Hudson Mohawk Section

Fredric L Aibel
Louis D LaTorre (J)

SOUTHERN REGION

Piedmont Section

John G Schoepf
*Kenneth L Brewton Jr**

Southeastern Section

Harrison S Weeks

Washington Section

Bernard G Kidda (J)

WESTERN REGION

Mid-West Section

Joseph H DiLorenzo (A)

NON-AFFILIATED

Zuri S Guindi
Suekichi Kabuki
Charles G Merrall
Masaharu Tanaka
Tokuji Saimei
Gaston H Vandendaele
*Thakorbhai J Patel**

Membership Applications

JULY 21-27, 1960

NEW ENGLAND REGION

Rhode Island Section

Senior

John F Ritchie—Finisher. Danielson Finishing Co, Danielson, Conn. Sponsors: J F Brennan, J A Brown Jr.

Junior

James E Murray—Supt of bleaching, Cranston Print Works Co, Cranston, RI. Sponsors: R H Phillips, J A Cooney.

SOUTHERN REGION

Piedmont Section

Senior

E Henry Pittman—Group leader, textile chemical research, Deering Milliken Research Corp, Spartanburg, SC. Sponsors: K S LaFleur, E D Bolinger.

Washington Section

Transfer to Senior

Kathryn M Towne—Technologist professor, National Bureau of Standards, George Washington Univ, Washington, DC. Sponsors: J M Blandford, F H Forziati.

COUNCIL HIGHLIGHTS

COUNCIL, at its 219th meeting, held May 27 at the Sheraton-Atlantic Hotel, New York, NY, approved AATCC membership in the International Federation of Associations of Textile Chemists and Colorists and the Society of American Archivists.

Councilors were advised by President Weldon G Helmus that, while it is the opinion of the Executive Committee on Research that AATCC become a full-fledged member of the American Standards Association, the Executive Committee was not ready to bring a recommendation to the Council pending further discussion of the subject by the Councilors. He asked the Councilors to take the subject back to their Sections for discussion and to pass their views on to the Executive Committee or their regional vice presidents.

* * *

Formation of a new Section in the State of South Carolina with Richard E Rettew as secretary pro tem has received the go ahead from Council.

J E Greer was appointed to fill a vacancy in the post of secretary pro tem of the previously approved proposed Section covering southern Virginia and northern North Carolina occasioned by the resignation of E A Murray.

* * *

Two standing committees of the Council were discharged and two new special committees born at the May meeting.

The Committee on Intersociety Relations has been discharged and its functions assumed by the Executive Committee, while the Committee on Technical Supplies has been discharged with the elimination of Article IV, Section 11 of the Bylaws.

On the recommendation of the Executive Committee, Council adopted a motion that it appoint a Committee on Organization to consider the adequacy of the Executive Committee to administer the affairs of the Association under the direction of the Council, and to report back to the Executive Committee prior to the November meeting. Members of this committee are: E R Kaswell, chairman, M A Dahlen, F Fortess, M Harris, S J Kennedy, C A Sylvester and N A Truslow.

Also on the recommendation of the Executive Committee, Council adopted a motion that an Employee Pension and Retirement Advisory Committee be appointed to consist of the president, the treasurer and the executive secretary. Primary function of this committee would be to confer with an employee when he retires, advising him of various possibilities concerning his retirement income and to handle other administrative problems as they might arise in connection with pension matters. The Middlesex County National Bank of Lowell, Mass, has been appointed trustee of the Pension Plan.

* * *

Actions regarding brokerage arrangements and custodial facilities for AATCC's securities were taken:

1) An account authorized with Bache & Co,

2) Treasurer authorized to sell and assign securities,

3) Securities belonging to the Association, whether consisting of certificates of stocks or bonds, may be deposited with Bache & Co to be held in safekeeping and that same be placed in negotiable form,

4) Instruct Bache &Co to remit to the treasurer or deposit in the Association's checking account designated by the treasurer, all income once each month, and

5) Instruct the treasurer that he should purchase and sell securities only in accordance with the Bylaws, as amended, and only with the advice and consent of the Appropriations Committee.

* * *

Council was advised of the following actions of the Executive Committee on Research:

In order to keep other organizations, particualrly ASA and ASTM, informed as to the development of new test methods or changes in the status of existing test methods, suitable machinery for this purpose has been set up at the AATCC National Headquarters at the request of the Executive Committee on Research. As a first step in closing an existing gap, ECR has confirmed the submittal of approximately thirty AATCC test methods to ASA for approval as American Standard. Thus, ASA's listing of AATCC test methods will be made current.

At the request of the Office of Technical Services, U S Dept of Commerce, ECR will appoint an AATCC representative to the Standing Committee for Commercial Standard CS11-41, Moisture Regain of Cotton Yarns. As in the case of other similar appointments, the AATCC representative to this committee would have voting power on test methods and only advisory power on standards.

As a result of a meeting of the ECR chairman and the AATCC executive secretary with the assistant general manager and technical manager of the Society of Automotive Engineers, closer cooperation between that organization and AATCC will be possible. The SAE will be invited to name representatives on AATCC research committees of interest to them.

A preliminary meeting is being planned for closer cooperation between AATCC and TAPPI.

A subcommittee of ECR, with F Fortess as chairman, to investigate and report on those phases of the recommendations of the Study Committee on Long-Range Objectives which concern the research and technical activities of the Association, has been set up.

A panel discussion is being set up for the Technical Program of the September 10, 1960 meeting in Atlanta. G S Wham, TCR chairman, will develop this program as part of the TCR meeting for that date.

ECR recommends that arrangements be made to manufacture, in the United States, Gray Scales used in the evaluation sections of many AATCC test methods.

ECR has approved the recommendation of the Technical Committee on Research that Tentative Test Method 84-1955, Determination of Electrical Resistive of Yarns, be elevated to Standard.

A letter has been received from the British Standards Institute requesting an opinion as to the desirability of holding a meeting of ISO/TC38 in the United States in the spring of 1961. P J Fynn and G S Wham will investigate and report on this matter to ECR.

The Committee on Evaluation of Creasing Properties of Fabrics (RR6) will be reactivated to study certain questions which have been raised relative to AATCC Tentative Test Method 66-1956, Evaluation of the Wrinkle Recovery of Fabrics by Means of the Wrinkle Recovery Tester.

Twenty-eight new appointments as recommended by chairmen of thirteen research committees and approved by the chairman of TCR

were confirmed by ECR. The appointments of chairmen of two reactivated research committees were approved.

* * *

The following slate of nominees for national offices in 1961 was submitted by the Nominating Committee:

For president—E Morrill

For vice presidents—W G Parks, New England Region; W S Sollenberger, Central Atlantic Region; A H Gaede, Southern Region; and J H Jones, Western Region.

* * *

Council was notified that Leonard S Little had been selected to receive the second Harold C Chapin Award.

* * *

The following appointments to the Committee on Technical Programs were approved: S G Turnbull Jr, chairman, Dorothy Achey, R S Babiarz, L B Cook, B F Faris, L A Hallet, S H Loper, C B Minoff, and W S Sollenberger.

* * *

President Helmus noted that at May 1, the Association had 7,267 individual and corporate members, the largest membership in its history. He attributed it to the efforts of the Individual Membership Committee, whose current membership drive will close at noon on October 8, the last day of the 1960 Convention.

* * *

Following a report by Elliott Morrill, chairman, National Convention Committee, on the convention picture through 1964, Council accepted an invitation from the Mid-West Section to hold the 1965 Convention in Chicago with that Section as host.

Mr Morrill announced that he had been furnished the first draft of a proposed Operating Manual for AATCC Convention Committees, which was under study. A second draft will be prepared and sent to members of the Committee shortly.

* * *

For Intersectional Contest Committee, Chairman Gillick reported that five Sections would compete in the 1960 Contest, which will be held the Friday afternoon of the 1960 Convention.

* * *

Council was advised that the modification of the *Colour Index* agreement with SDC had been formally executed on April 26.

* * *

Income from individual membership dues was ahead of last year by $2,473; corporate membership dues ahead by $475. Income from technical supplies and royalties was over $3000 in excess of the same period in 1959.

* * *

The next meeting of the Council will be held at the Atlanta-Biltmore, Atlanta, Ga, on September 9 at the invitation of the Southeastern Section.

The Association will hold its Annual Meeting in conjunction with the Council meeting on Friday, November 18, in New York.

Employment Register

This column is open for two insertions per year, per member, without charge. Blanks may be obtained from, and filed with, the secretary of the Association, Post Office Box 28, Lowell, Mass. It is understood that these will be open to inspection by prospective employers who can obtain further information from the secretary.

60-12

Education: BS, North Carolina State College; Lieut (jg), USNR.

Experience: Print chemist.

Position desired: Finishing chemist (dyeing-printing-finishing).

Location: Piedmont or Southeastern Section.

Age: 37; married; two dependents; references.

8-8, 8-22

60-13

Education: BA, Chemistry.

Experience: Lab technician; manager lab dyeing and managing supt dyeing.

Position desired: Superintendent of dyeing and finishing or dyer

Location: Canada (Quebec or Ontario Province) or Northeastern States

Age: 29; married; two dependents; references.

8-22, 9-5

AATCC Calendar

COUNCIL, COUNCIL COMMITTEES, RESEARCH COMMITTES

Sept 8-10 (Atlanta-Biltmore Hotel, Atlanta, Ga); Sept 8-9—Council Committees and Research Committees; Sept 9—Council; Sept 10—TCR

Nov 17-18 (Sheraton-Atlantic Hotel, New York, NY); Nov 17—Council Committees and Research Committees; Nov 18 (AM)—ECR, TCR; Nov 18 (PM)—Council and Annual Meeting

NATIONAL CONVENTIONS

Oct 6-8 (Sheraton Hotel, Philadelphia, Pa); Sept 28-30, 1961 (Hotel Statler, Buffalo, NY); 1962 (Southern Region); 1963—Boston; 1964—New York; 1965—Chicago

DELAWARE VALLEY SECTION

Sept 16 (Reading, Pa); Nov 4, Dec 9 (Philadelphia, Pa)

NIAGARA FRONTIER SECTION

Sept 23 (Buffalo, NY); Nov 4 (Annual Business Meeting, Buffalo, NY); Apr 7 (Joint meeting with Ontario Section, CATCC, St Catherines, Ont); May 18 (Buffalo, NY)

NORTHERN NEW ENGLAND SECTION

Sept 9 (Outing—Wachusett Country Club, West Bolyston, Mass); Oct 21 (Hotel 128, Dedham, Mass—"Customer Service"—Arthur Swenson, J P Stevens & Co, Inc, and P J Fynn, J C Penney Co); Dec 9 (Colonial Country Club, Lynnfield, Mass—"Present-day Economic Otulook in Textiles"—William I Kent, Kent Mfg Co); Jan 20 (Hotel 128, Dedham, Mass—Symposium on "Mechanical and Chemical Finishing of Textile Fabrics"—John J McDonald, Lowell Technological Inst, D D Gagliardi, Gagliardi Research Corp, and Werner von Bergen, J P Stevens & Co, Inc)

PACIFIC SOUTHWEST SECTION

Sept 24-26 (Outing—Apple Valley, Calif); Nov 18 (Rodger Young Auditorium, Los Angeles, Calif); Dec 10 (dance)

PIEDMONT SECTION

Sept 23-24 (Hotel Charlotte, Charlotte, NC); Jan 21 (Poinsett Hotel, Greenville, SC); April 2 (Washington Duke Hotel, Durham, NC); June 9-10, 1961 (Outing—Grove Park Inn, Asheville, NC); Sept 23, 1961 (Hotel Charlotte, Charlotte, NC)

RHODE ISLAND SECTION

Sept 23 (Management Night); Oct 28 (Providence Engineering Society); Dec 2 (Annual Meeting—Johnson's Hummocks)

SOUTH CENTRAL SECTION

Sept 17 Andrew Jackson Hotel, Knoxville, Tenn); Dec 9 (Hotel Patten, Chattanooga, Tenn)

SOUTHEASTERN SECTION

Sept 10 (Atlanta-Biltmore Hotel, Atlanta, Ga); Dec 3 (Atlanta Athletic Club, Atlanta, Ga)

WESTERN NEW ENGLAND SECTION

Sept 23 (Blake's Restaurant, Springfield, Mass); Oct 21 (Annual Meeting, Rapp's Restaurant, Shelton, Conn); Dec 2 (Rapp's Restaurant, Shelton, Conn)

"New Fibers—New Blends—New Fabrics"

TECHNICAL PROGRAM FOR '60 CONVENTION

October 6, 7, 8 • Sheraton Hotel, Philadelphia, Pa

1960 TECHNICAL PROGRAM COMMITTEE—L to r: Burt F Faris, E I duPont de Nemours & Co, Inc; Samuel H Loper, E I duPont de Nemours & Co, Inc; Louis B Cook, Millville Mfg Co; S Graeme Turnbull, E I duPont deNemours & Co, Inc, chairman; William S Sollenberger, American Viscose Corp; Dorothy McAchey, Blue Ridge Textile Co; Raymond S Babiarz, Joseph Bancroft & Sons Co. Missing when photo was taken were Lawrence A Hallett, Jefferies Processors, and Charles B Minoff, Jaunty Fabric Corp.

S GRAEME TURNBULL JR, E I duPont de Nemours & Co, Inc, chairman, Technical Program Committee, has announced the content of the 1960 Convention Technical Program, which will amplify on the Convention theme "New Fibres—New Blends—New Fabrics".

THURSDAY MORNING, OCTOBER 6, 9 am to 12:15 pm———

"Dyeing and Finishing of New Cellulosic Fibers"—Walter J Hamburger, Fabric Research Laboratories, Inc (moderator) and a panel of speakers representing fiber manufacturers

"Fabrics from Creslan Acrylic Fiber"—H C Haller, American Cyanamid Co

"Continuous Dyeing on the Monforts Reactor of Hydrophobic Fiber Fabrics in the Synthetics Dyehouse"—Fred Fortess, Celanese Corp of America

"Dyeing and Finishing of Man-made Fibers in a Cotton Finishing Plant"—Heyward Simpson, Reeves Bros, Inc

Panel discussion

THURSDAY AFTERNOON, OCTOBER 6, 12:45 pm to 4:00 pm

Awards Luncheon

Awards and Acceptances

"Improved Textile Properties from New Chemical Structures"—Arnold M Sookne, Harris Research Laboratories, 1960 Olney Medal Address

"Science and Craft in Color"—Jacques E Wegmann, Toms River Chemical Corp, presentation of Ciba Co Inc's Eidophore, a closed-circuit color television presentation

FRIDAY MORNING, OCTOBER 7, 9:00 am to 12:15 pm———

"Acrilan, Acrilan 16 and Their Blends"—Walter Stump, Chemstrand Corp

"Modern Continuous Dyeing Processes"—Richard Kern, Sandoz, Ltd

"Rovana—A Versatile New Yarn"—C R Sheehan, Dow Chemical Co

"Reducing the Felting Shrinkage of Wool"—Fred H Steiger, Rohm & Haas Co

"Dyeing and Finishing Blends of Wool and the Man-made Fibers"—J T Wilson, Excelsior Mills No. 4

"Fabric Development from a Practical Dyer's Viewpoint"—J E Greer, Greensboro Finishing Co

FRIDAY AFTERNOON, OCTOBER 7, 2:15 pm to 4:30 pm—INTERSECTIONAL CONTEST———

"Concurrent Dyeing and Finishing of Cellulosic Textiles"—Delaware Valley Section

"A Study in Union Dyeing"—Northern New England Section

"Chemical Mechanisms in Chlorine Retention by Resin-treated Cotton Fabrics"—Piedmont Section

"A Study of Fluorocarbon Finishes and Their Effect on Dyestuffs"—Rhode Island Section

"Selection of Direct Dyestuffs for Application to Undesulfured Rayon Staple"—Southeastern Section

SATURDAY MORNING, OCTOBER 8, 9 am to 12:00 noon———

"Dyeing with Vinylsulfon-Reactive Dyes" Hans Luttringhaus, Carbic-Hoechst Corp

"Status of Nonwoven Fabrics in the Textile Trade"—Howard E Shearer, American Viscose Corp

"New Fibers from DuPont"—M M Christie, E I duPont de Nemours & Co, Inc

"Recent Developments in the Dyeing of Verel Modacrylic Fiber"—Robert J Fortune, Tennessee Eastman Co

"New Color Measuring Instrument for Use by the Textile Industry"—F J Rizzo, QM Research and Development Command, US Army

"The Textile Industry Looks Ahead"—(speaker to be announced)

FINAL PLANS are being made by the various subcommittees making up the Executive Committee for the 1960 AATCC Convention to be held October 6, 7 and 8 at the Sheraton Hotel, Philadelphia, Pa, and from all appearances this should be one of the Association's most outstanding.

REGISTRATION—The Registration Committee has engaged adequate facilities and personnel to allow for prompt and orderly registration. Committee Chairman A E Raimo, John Campbell & Co, and Cochairman Ernst W Empting, Verona Dyestuffs, have announced that early arrivals will be able to "sign in" on Wednesday, October 5, 4 pm to 9 pm. Registration will continue Thursday, Friday and Saturday.

DINING—Dining Committee Chairman Joseph J Murphy, Laurel Soap Mfg Co, Inc, reports that the Banquet Department of the Sheraton Hotel has been instructed to "put the best food forward", and send us away praising their "home cooking". It is promised that the Awards Luncheon on Thursday and the Annual Banquet on Saturday Night will be the "best ever."

LADIES — Matthew A Noonan, Becco Chemical Division, chairman of the Ladies Committee, advises that his committee has planned a program which will include a cocktail party, tour of historic Philadelphia, and a luncheon served at the exclusive Cherry Hill Inn in nearby New Jersey. This will be one of the very enjoyable functions of the Convention. Don't let your wife miss it!

HOTEL—Charles N Kuzma Jr, Amalgamated Chemical Corp, chairman of the Hotel Committee, reports that facilities in Philadelphia will be as luxurious, economical and adequate as may be desired.

The Warwick and Drake Hotels, conveniently nearby, will cooperate with the headquarters Sheraton Hotel in providing rooms and suites for AATCC members and guests. These are three of Philadelphia's finest hotels, located in the heart of the city.

Further information on hotel facilities and reservations for rooms will be available shortly. However, it is not too early to give advance consideration to the hotel facilities you will want while attending the '60 Convention.

ENTERTAINMENT — "The Great Moments of Broadway", a narrated musicale, will be presented following the Annual Banquet on Saturday evening. This production will feature outstanding stars of the Broadway stage. Entertainment Committee Chairman Walter W Gleadall, Textile Chemical Co, assures us that this will be a memorable evening of entertainment for all attending.

PRINTING—The membership at large little realizes the importance of an effective and efficient Printing Committee chairman. The various forms for registration, programs and countless other matters so essential to a well-run Convention are being handled capably by Clarence A Seibert, Scholler Bros, Inc.

JOSEPH J MURPHY
Chairman
Dining Committee

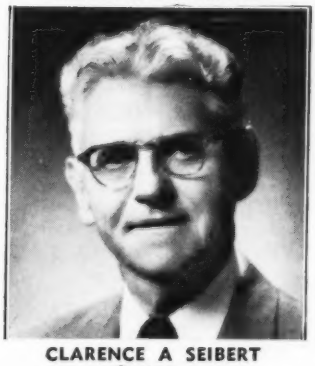
A E RAIMO
Chairman
Registration Committee

MATTHEW A NOONAN
Chairman
Ladies Committee

WALTER W GLEADALL
Chairman
Entertainment Committee

ERNST W EMPTING
Cochairman
Registration Committee

CHARLES N KUZMA JR
Chairman
Hotel Committee



CLARENCE A SEIBERT
Chairman
Printing Committee

ORGANIZATION OF THE AATCC

FOUNDER

LOUIS A OLNEY
(deceased)

COUNCIL OF THE ASSOCIATION

PRESIDENT ..... WELDON G HELMUS, Fair Lawn Finishing Co, Fair Lawn, NJ

VICE PRESIDENTS ..... *(New England Region)*: W GEORGE PARKS, University of Rhode Island, Kingston, RI; *(Central Atlantic Region)*: W S SOLLENBERGER, American Viscose Corp, Marcus Hook, Pa; *(Southern Region)*: A HENRY GAEDE, Laurel Soap Mfg Co, PO Box 1083, Charlotte 1, NC; *(Western Region)*: JOSEPH H JONES, Phoenix Dye Works, 4755 W 150th St, Cleveland 35, O.

TREASURER ..... ARTHUR R THOMPSON, Ciba Co, Inc, PO Box 1988, Charlotte 1, NC

EXECUTIVE SECRETARY ..... GEORGE P PAINE, AATCC National Headquarters, PO Box 28, Lowell, Mass

CHAIRMAN, EXECUTIVE COMMITTEE ON RESEARCH ..... CHARLES A SYLVESTER, E I duPont de Nemours & Co, Inc, Rm 8516, Nemours Bldg, Wilmington 98, Del.

PAST PRESIDENTS (Living) ..... ELVIN H KILLHEFFER, P J WOOD, WILLIAM H CADY, CARL Z DRAVES, THOMAS R SMITH, WILLIAM D APPEL, HENRY F HERRMANN, C NORRIS RABOLD, J ROBERT BONNAR, GEO O LINBERG

NATIONAL COUNCILORS REPRESENTING SECTIONS
(Northern New England): J J O'NEILL JR, R J PEIRENT, G F QUIGLEY; *(Rhode Island)*: R F CAROSELLI, E W LAWRENCE, A F McLEAN, R B TAYLORSON; *(Western New England)*: A W GOODWIN; *(Delaware Valley)*: T H HART, L K McCHESNEY, M J REIDER, D W ROBINSON, J E CONWAY; *(Hudson-Mohawk)*: J J HANLON; *(Metropolitan)*: W A HOLST, P J LUCK, R E MILLER, R P MONSAERT JR, B F QUIGLEY, E I STEARNS, G S WHAM; *(Niagara Frontier)*: J E LOUGHLIN; *(Piedmont)*: J C KING, E A MURRAY, W E RIXON, R E RUPP, N A TRUSLOW, C L ZIMMERMAN; *(South Central)*: R N INGRAM, J D MOSHEIM; *(Southeastern)*: J C COOK, W E FAYSSOUX, J W RICHARDSON; *(Washington)*: L SMITH; *(Mid-West)*: A I HULTBERG, J G KELLEY, A J OLSON; *(Pacific Northwest)*: J L AYRES; *(Pacific Southwest)*: P F NOONAN

TREASURER EMERITUS

WILLIAM R MOORHOUSE
PO Box 352, South Yarmouth, Mass

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Executive Committee of Council	WELDON G HELMUS
Executive Committee on Research	CHARLES A SYLVESTER
Technical Committee on Research	GEORGE S WHAM
Publicity	EDWARD ARTIM
Appropriations	THOMAS R SMITH
Membership and Local Sections	W GEORGE PARKS
Publications	PAUL J LUCK
Corporate Membership	C T ANDERSON
Constitution and Bylaws	WILLIAM A HOLST
Conventions	E MORRILL
Technical Program	S G TURNBULL JR
Archives	SIDNEY M EDELSTEIN
Textile Education	LEONARD SMITH
Subject and Speakers' Bureau	MATTHEW J BABEY

SPECIAL COMMITTEES—

Intersectional Contest	THOMAS J GILLICK JR
Employee Pension and Retirement Advisory	WELDON G HELMUS
Harold C Chapin Award	DONALD W ROBINSON
Study Committee on Intersectional Contest	THOMAS J GILLICK JR
Study Committee on Endowment Fund	P J WOOD
Individual Membership	H A STAUDERMAN
Study Committee on Location of National Headquarters	SYDNEY M CONE JR
Organization	ERNEST R KASWELL
Student Award	JOSEPH LINDSAY JR
Olney Medal	E W LAWRENCE
American Dyestuff Reporter Award	CARL Z DRAVES

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SENIOR STAFF

Executive Secretary	GEORGE P PAINE
Technical Manager	GEORGE J MANDIKOS
Staff Editor-Research Associate	G ROBERT THOMPSON
Research Associate	GLEN M KIDDER

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STUDENT CHAPTERS

Auburn University, Bradford Durfee College of Technology, Clemson College, Georgia Institute of Technology, Lowell Technological Institute, New Bedford Institute of Technology, North Carolina State College, Philadelphia Textile Institute, Rhode Island School of Design

AUGUST ANDANTE
1960

Inter Alia—Inter Nos

P J WOOD

SOMETHING NEW UNDER THE SUN

We were beginning to think that the possibilities in the region of bulking yarns were about exhausted. But in the Autumn* 1960 number of the New Zealand Textile Journal is an announcement of yet another "completely new bulking process for Terylene". This fiber is made by Imperial Chemical Industries. Its American counterpart, Dacron polyester fiber, is made by Du Pont. *Their autumn is our spring: Remember?

Undoubtedly, the process will be eventually applied to many other yarns, but when used on Terylene it is known by the trademark Crimplene.

So far, it seems, the use of this new bulked fiber is confined to the manufacture of hand-knitting yarns. The author of this article tells us that these yarns were first exposed to public view last September at the Knitting Wool Trade Fair in Harrowgate, which we respectfully submit should be Harrogate. (Never mind, Mr Franklin Marker, many an American or English editor might easily come a cropper in the spelling of some of your New Zealand place names, for instance, Papatoetoe, Te Aroha and Tokoroa, eh wot?).

The knitted grass green jacquard knitted day dress illustrates the lovely draping quality of such a fabric. The caption speaks of the skirt of this ensemble as one which "will never sag or seat". Truly descriptive, Elmer calls it.

Veneziani of Italy, who is responsible for the above-mentioned costume, has created also an afternoon dress printed in a gorgeous pattern in blues and greens "caught just below the knees by a wide straight band". We like the design and the description of the coloring, but personally do not care overmuch for that "wide straight band" that is reminiscent of the "hobble" skirt, to which we were never partial. We have vivid memories of the difficulty devotees of this style had in mounting the steps of a trolley car. (Someday, for the benefit of our younger readers, if any, we will tell something about the trolley car, possibly including that horse car that used to run up and down Chambers Street, New York.) This operation requires agility of a highly developed order; even the most expert rarely accomplish it without undue exposure. Of course this is only one man's opinion, which is all this column ever set out to be. We might add that we consider ourself lucky that we were born of the male persuasion, as women seem to require several costume changes per diem; lounging robe, morning suit, afternoon dress, cocktail ditto, winding up with an evening gown. What we like to do is to get up in the morning, put on A suit and remain faithful to that particular garb until we retire at night. One of the things we don't care for on board ship is donning evening togs for dinner, night after night; and we really love sea-travel.

Celli, also an Italian couturier (dressmaker to you, Elmer), has designed and executed a loosely knitted sweater for casual wear of this same soft, drapy material of fetching appearance that is said to retain its shape. We are told that all these garments can be washed in a washing machine, and of course, they come out of the wash soft.

FACE SAVING?

In a recent number of Diners' Club Magazine, Matty Simmons, whose name appears at the masthead as executive editor, makes known the invention of one of his friends designed for henpecked husbands who wish to retain their masculinity - tweed aprons.

Belonging in the same category is a later entry in this blithe and sprightly column: "The man who asks his wife for advice just hasn't been listening."

LEADERSHIP

"I'll tell you how to pick a good leader; see what kind of issues he stresses. Are they good and fine, or are they unworthy of your loyal support? Is he building harmony or is he tearing it down? Is he engrossed mostly with promoting his own affairs and the affairs of his clique, or does he act as if he remembers that no country can unless its citizens have an eye to the common good?"

Particularly apropos are these wise words of Clinton E Bernard published a little while ago in Good Business, now that we are approaching the time when we are about to exercise the franchise to choose our executive leaders for the next four years, which may be some of the most momentous ones through which we have ever lived. Let us address ourselves to this patriotic duty thoughtfully, seriously, yea, even prayerfully. God bless America.

LEARNING

Said Henry S Haskins, "The man who is too old to learn was probably always too old to learn".

PROPHECY

We have it on the authority of Holy Writ that "a prophet is not without honor, save in his own country"; so we hesitate to include the name of George O Linberg among the prophets, either major or minor.

But the fact remains that he did forecast, in the Foreword in the AATCC Technical Manual of 1958 as follows - quote: "In an age when science and technology are unlocking the secrets of the universe, we are tempted to direct our attention away from the riddles and mysteries close at hand, yet unsolved. If man is to travel to the moon, can we speculate on the upholstery in his space ship, what he will wear and how these fabrics will react in the ionosphere?.....Throughout the years, AATCC has been noted for keeping pace with new developments so that the industry might have at its fingertips an authoritative reference for solutions to its programs. The pages of this book are testimony to the validity of the Association's objectives..... Within the framework of dedicated responsibility for the advancement of science, AATCC will continue to meet the challenge of the future - a future when our Technical Manual may contain the report of a Research Committee on Space Fabrics." - Unquote.

From an article that appeared in the June 9th issue of Daily News Record, pages 17 and 18, we learn that an English waterproofer and garment manufacturer of Manchester, P Frankenstein & Sons Ltd, has developed a suit capable of keeping a man alive at altitudes comparable to conditions of space. The illustration shows what the makers call a pressure breathing jerkin designed for emergency escape, worn with a barometrically controlled helmet, the visor of which drops shut when pressure falls. (Better not have his tongue sticking out when that happens. Elmer)

The helmet is faced with transparent Terylene (Dacron) material which will withstand a pressure of 28,000 pounds per square inch.

The garment consists of two complete suits one within the other, the inner one is the atmosphere container and the outer one acts as a reinforcer.

From a clipping, sent to us by a friend who knows how interested we are in anything and everything, we learn that there are several research reports on space clothes available on application to the government.

Says Elmer, "looks as if George hit the jackpot that time".

WIE GEHT'S IHNEN

New greeting going around Washington these days: "What's poisonous this morning?"--The Insider's Newsletter.

CHARACTER

In the February number of the Journal of Education is an article on this subject by three distinguished writers, Ralph J Garry, John Gawrys Jr and Carole Lee Phillips. It contains these wise words: "The gauge of character is that which an individual stands for, believes in and defends, that which he strives for, and particularly the means he adopts to achieve his ends".

HAPPINESS

Says the Plainfield, Indiana Messenger, "It is not how much we have but how much we enjoy that makes happiness". To this bon mot we might modestly add "Yes, and what we enjoy".

EDUCATION

The late president of Kenyon College, Gordon Keith Chalmers, wrote a book "The Republic and the Person" (Regnery) in which occurs this worthwhile observation . . ."Education is converting the mind from a knowledge and love of what is meant to a knowledge and love of what is noble".

And here are the words of another wise man for the especial benefit of recent graduates from what Elmer calls "the holes of learning": "Graduation from school or college does not make a liberally educated man or woman. To become liberally educated, those who have finished with formal schooling must keep their minds at work". - Leon Gutterman, editorial, Wisdom.

SOCIOLOGICAL ASPECT

Anne Fallon, in the June 27th issue of Digest for Soap & Detergent Executives, draws attention to an article by the woman's news editor of Savannah News, Harriet Train Blake. It appeared in the May number of Launder-Matic Age. It is quaintly titled "Laundromat Replaces Back Fence, Village Square, Town Pump, as Social Center".

The free sample which Miss Fallon includes with this short review is calculated to supply a second motive for looking up this article, the first, of course, being the intriguing heading. Here is the specimen: "Sociologists have come to the conclusion that the location of coin-operated washing machines has caused a minor social revolution, for they say it is to these locations that the housewife hurries to gather the latest neighborhood gossip, garner the latest hot recipe, and incidentally to do the household laundry".--QEF

9th CFC to Highlight Cotton Structure, Mechanisms of Crosslinking

The structure of the cotton fiber and mechanisms of crosslinking will be emphasized in the program of the ninth annual Chemical Finishing Conference this year, according to the National Cotton Council, sponsor of the meeting.

In addition, three new nonresin finishes for "easy-care" cottons will be discussed, as will recent developments in soil- and stain-resistant finishes.

The conference will be held on September 28 and 29 at the Statler Hotel in Washington, DC. General chairman will be Godfrey Rockefeller, president, National Assoc of Finishers of Textile Fabrics and president, Cranston Print Works Co, New York, NY.

Session chairmen will be Richard F Aurich, Joseph Bancroft and Sons Co, Wilmington, Del; L Aubrey Goodson Jr, director of research and development, Dan River Mills, Danville, Va; Arnold M Sookne, associate director, Harris Research Laboratories, Washington, DC; and George S Buck Jr, assistant to the executive vice president, National Cotton Council, Memphis, Tenn.

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"Easy-Care" Finish Applications Up

"Easy-care" finishes were applied to 41 percent of the yardage in outlets comprising the major share of cotton's domestic markets in 1959, according to a National Cotton Council market survey released last month.

This was a seven percent increase over 1958, the study points out. The report, a comprehensive survey of the market, is entitled "Easy Care Cottons."

Production of "easy-care" fabrics during 1959 totaled approximately 3 billion linear yards, with cotton accounting for 63 percent of the total.

One hundred percent synthetic fabrics accounted for 18 percent of the total, rayon for 13 percent, cotton-synthetic blends four percent, and synthetic blends two percent. An estimated 1.89 billion linear yards of "easy care" cottons were produced.

According to the survey, production of resin-finished broad woven cotton fabrics increased from 600 million linear yards in 1955 to almost 1,900 million in 1959.

"While it now appears that the rate of increase in production of resin-finished cotton fabrics is leveling off, current interviews with cutters and retailers indicate that the growth trend is still upward.

"Furthermore, a leveling off in production suggests that consumers are waiting for further improvements in 'easy-care' qualities rather than that the demand for 'easy-care' products has been saturated," the report states.

In terms of square yards, resin-finished cottons in apparel uses totaled 1,625.7 million in 1959, while consumption in household uses reached 435.4 million.

Women's and misses' apparel accounted for 772.8 million square yards; men's and boys', 650.5 million; and clothing for girls, children and infants, 202.4 million.

Apparel and household uses in 1959 accounted for 81 percent of the total consumption of cotton, the study notes. Joseph L Williams and Frank A McCord, Council market researchers who compiled the report, point out that in these uses "individual consumers have a strong voice in fiber selection and 'easy-care' properties influence their choices."

Approximately 52 percent of domestic cotton consumption is in apparel uses and cotton's percentage of the total fiber use in this market increased from 56 in 1947 to 61 in 1959, the survey shows.

"'Easy-care' cottons have been a major factor in cotton's competitive gains in apparel items and further improvements in 'easy-care' qualities will accelerate such gains," the market researchers observe.

An analysis of fiber consumption and of consumer likes and dislikes in uses accountng for about 90 percent of the total cotton consumption in this country indicates "easy-care" qualities are desirable in outlets accounting for almost 7.25 billion square yards of fabrics annually.

This indicates that these qualities now figure in more than half the total domestic consumption of broad woven fabrics. Woven fabric consumption in 1959 in uses where "easy-care" qualities are important totaled 7,288 million yards—5,260 million for cotton and 1,968 million for other fibers.

Cotton reportedly accounted for 73 percent of the total consumption of woven fabrics in uses in which consumers want "easy-care" qualities. From this, it is indicated that:

1) "Easy-care" qualities would strengthen cotton against competitive losses in outlets now accounting for about 5.25 billion yards annually.

2) Satisfactory "easy-care" qualities would help cotton achieve competitive gains in uses consuming about two billion square yards of competing materials.

3) The annual demand for chemicals or other products to process textiles for "easy-care" qualities is equivalent to the quantity of materials needed to process 7.25 billion square yards.

4) Demand for "easy-care" qualities is distributed among wide segments of both apparel and household uses.

Single copies of "Easy Care Cottons" are available free from the Market Research Section, Utilization Research Division, National Cotton Council, Box 9905, Memphis 12, Tenn.

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Metro-Atlantic International Formed

Joseph E Buonanno, president of Metro-Atlantic, Inc, Centredale RI, has announced the formation of a new corporation, named Metro-Atlantic International, with headquarters in Centredale.

Metro-Atlantic International has been formed to expand sales of Metro-Atlantic's chemicals and dyestuffs in foreign markets. The new corporation is making plans to acquire or build manufacturing plants within the European common market and the proposed Latin American common market.

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Morton Machine Names Parrott and Ballentine Southern Sales Agents

Harry C Jackson, president, Morton Machine Works, Inc, Columbus, Ga, has announced the appointment of Parrott & Ballentine as Southern sales agent for Morton's complete line of package, beam, and raw stock dyeing and drying equipment.

Parrott & Ballentine has sales offices at 3440 August Road, Greenville, SC. Traveling from this office are Perry M Parrott, Joe M Ballentine and John F Derryberry. Other sales engineers of the organization are Sam H Huffstetler, located in Burlington, NC, and John T White, who resides in LaGrange, Ga.

Parrot & Ballentine recently resigned as sales agents for Turbo Machine, Co, Lansdale, Pa.

Cloverdale Dye Works Expansion Nearing Completion

Highland Cotton Mills, Inc, High Point, NC, recently announced the beginning of the final stage of a major expansion of its Cloverdale Dye Works in High Point.

Nathan M Ayers, executive vice president, said, in announcing the near completion of the $250,000 expansion program, that "the new facilties permit Cloverdale to meet the sharply increased demand for its packaged-dye yarns from the growing knitted outerwear trade." Highland is able to supply dyed combed and carded yarns, as well as natural yarns, from its own spinning operations.

H F Hunsucker Jr, executive vice president, noted that the Cloverdale facilities, a part of Highland Cotton Mills, Inc since 1956, have been revamped on a gradual basis in order not to interfere with production. All dye machines reportedly have been completely modernized and new and larger machines are also to be installed soon to meet the demand for very large dye lots from customers who use large quantities, but who wish to hold the number of dye lots to the minimum, it is stated. The several winding rooms have been equipped with the latest winding equipment, it is noted. Separate winding rooms are used to eliminate the possibility of one color contaminating another during the winding process.

In addition, Avesta rapid drying equipment, which is manufactured by Gaston County Machine Company, has also been installed.

It was also noted that, in addition to the present building, an extension is nearing completion which will house a completely new and modern chemical mixing room, and laboratory facilities also are being materially expanded.

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Copper Hydrate Price Reduced 25%

Republic Chemical Corp, 94 Beekman St, New York, NY, has announced a price reduction of 25 percent for copper hydrate, also known as copper hydroxide, which it supplies in pulp form. The reduction is said to be due to expanded facilities and the use of a unique process.

Copper hydrate is used in the manufacture of copper salts; manufacture of rayon; as a mordant in textile dyeing; for pigments; and as a laboratory reagent.

E J Berger (foreground), vice president, Turbo Machine Co, Lansdale, Pa, attended the International Machinery Exhibition in Barcelona, Spain, in June. He is shown explaining the operation of the Turbo dye boarder, hosiery dyeing and finishing machine, to John Davis Lodge, U S Ambassador to Spain. The licensed builder for the machine in Spain is Argelich, Termes YCA, Tarrasa.

Wica Initiates "In-and-Out" Service

Wica Chemicals, Inc, Charlotte, NC, reportedly has increased the volume of customer laboratory service with the employment of an "in-and-out" work flow method.

Credit goes to Walter V Walukewicz, manager of Wica's Textile Service Laboratories, who has streamlined coordination of laboratory activity. "In-and-out" is designed to shorten the time lag between customer requests and interpretive data required for optimum economy and efficiency in the mill's application of derived techniques.

Mr Walukewicz stated that an entirely new approach to a wide range of laboratory services has been developed in order to focus on specific effects from Wica's 189 specialty chemicals for the textile industry. Demands for technical services have grown with varying requirements of fiber, blends, goods and end uses. Wica stipulates modification of chemicals at critical stages in dyeing and finishing.

Wica's field representatives report the "in-and-out" service has been well accepted by the industry.

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Latest LTI Projects on TV

Projects under way at Lowell Technological Institute in textile testing, ionospheric and crystal physics, silicone chemistry, and satellite tracking, will be discussed in a half-hour telecast, "Operation Breakthrough," on Channel 4, WBZ-TV, Boston, on Sunday, Sept 11, at 5 pm. The program, a public-service feature of the station, each month is presenting the educational research facilities of a major college in Massachusetts.

Lowell Tech and its affiliated Research Foundation are cooperating with WBZ-TV in the program which will be produced by Tom Knott and narrated by Victor Best of the station. LTI faculty and research staff members participating will be Martin J Lydon, president, Charles R Mingins, Jacob K Frederick Jr, Dorrance H Goodwin, Ronald M Pike, and Kenneth F Kinnard, who will describe their areas of research and plans for future development. Other areas of the Institute also will be shown.

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Francolor Representing French Alginate Producer

Francolor Inc, Woonsocket, RI, Division of Compagnie Francaise des Matières Colorantes, Paris, France, recently announced that it has been appointed exclusive sales representatives for Alginates Maton, 24 rue Murillo, Paris 8, France, reportedly the largest producers of French alginate and one of the leading European alginate producers.

A close relationship is maintained between Alginates Maton and the development laboratories of CFMC in Villers Saint-Paul, Creil, Oise, France. Francolor Inc points out that many of the formulas recommended in its various technical bulletins issued to the trade refer to Alginates Maton's products.

It is felt that, in view of its close collaboration at the development level with Alginates Maton, Francolor will be able to bring to the US market a new high-quality alginate, as well as further technical information on the application and selection of optimum alginates for each dyestuff offered or used.

The main trade marks of Alginates Maton are: Matonalg HV, Matonalg HV/KP/S 10, Matonalg HV/VER, Matonalg TBV/S, and a carraghenate, Gomarine CKV/T 200.

SHELL PERSONNEL ATTEND TEXTILE COURSE AT LTI—Attending a special week-long program on textile processing operations arranged for Shell Chemical Co and Shell Development Co personnel at Lowell Technological Institute in June were those shown, l to r. First row: R J Cullen, R F Buller, Marguerite Naps, R J Solari, P R Edinger, J W Sweeney, a guest lecturer. Second row: E M Monahan, O Johnson, R C Witman, D S Grigsby, F C Herot. Third row: C W Smith, J H DeNike, W B Elmer, E R Bell, P H Williams, and A F Lane.

Shell Personnel Attend LTI Textile Course

Representatives of various areas attended a special week's program for Shell Chemical Co and Shell Development Co personnel at Lowell Technological Institute in June under the sponsorship of the LTI Division of Textiles.

The program was part of the division's summer professional development curricula in textiles and pertained to textile processing operations from fibers through finished fabrics. Directing the program was Jacob K Frederick Jr, division chairman, who was assisted in the lectures and seminars by Fritz F Kobayashi, department of fibers and yarns; Albert T Woidzik, department of fabrics; David H Pfister, department of evaluation; James W Sweeney, chief chemist at Pellon Corp in Lowell; and by John J McDonald, head of the finishing department.

Shell Development Co personnel attending from Emeryville, Calif, were Marguerite Naps, E R Bell, C W Smith, and P H Williams. Shell Chemical Co was represented in its Industrial Chemicals Division by P R Edinger and W B Elmer of Atlanta, Ga, O Johnson of Newark, NJ, R J Solari of Charlotte, NC, F C Herot of Emeryville, Calif, and J H DeNike, E M Monahan, D S Grigsby, A F Lane, and R J Cullen, all of New York, NY. In attendance from the Union, NJ, Technical Service Laboratory were R F Buller and R C Witman.

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Felters Co Purchases New Plant at Millbury, Mass

The Felters Company of Boston has purchased the Millbury, Mass, plant of Watson-Williams Mfg Co, in an expansion move to provide warehouse space and improve service to customers.

The Watson-Williams plant at 57 River Street is a 35,000-square-foot, two-story frame building. It is in the process of being vacated by its present owners, who announced in April that they would transfer all operations to Pinebluff, NC, this month.

Plans call primarily for expansion and warehousing, although some light manufacturing will be done, principally on Unisorb, a Felters Company product used extensively for mounting machinery to reduce noise and vibration.

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Howell Associates to Represent BCCC in NY

Berkshire Color & Chemical Corp, Springfield, Mass, has announced the appointment of John F Howell Associates, Delmar, NY, as its representative in New York State.

John F Howell, formerly affiliated with Albany Felt Co, Albany, NY, heads the Howell organization, which will handle Berkshire's line of aniline dyestuffs and chemical processing auxiliaries.

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Service Life for Outdoor Fabrics Increased by Wet Finishing Operations

Wet finishing processes, such as desizing, scouring, and bleaching, make outdoor cotton fabrics stronger and less susceptible to mildew, according to research workers at the USDA's Southern Utilization Research and Development Divison in New Orleans, La.

As part of a research program conducted in cooperation with the Canvas Products Association International, they investigated the effects of these operations and found that these treatments, although inexpensive, tended to purify cotton cellulose and reduce the foreign substances which encourage the growth of microorganisms. They are not proposed as substitutes for chemical treatments, however, but only suggested as supplemental finishes to help combat exposure problems.

Some of the results of comparative tests conducted on gray and scoured fabrics show that mildew became apparent on the gray fabric within three months after outdoor exposure was begun, whereas the scoured fabric showed little or no indication of mildew in the same period. After 12 months exposure, the scoured fabric had 56 lbs strength compared with 20 lbs for the gray duck.

Similar interesting results were obtained on cotton oxford fabric, one part of which was kept in gray, another part desized and the remainder desized, scoured and bleached. Results after exposure clearly showed the value of removing noncellulosic constituents from cotton fabric intended for use outdoors. At the end of six months, the gray fabric had 26 lbs of breaking strength, the desized, 33 lbs, and the desized, scoured and bleached, 39 lbs, although before exposure the gray fabric was slightly stronger than the others.

These and other practical demonstrations of the value of scouring and bleaching for vinyl coated fabrics were published recently in *Canvas Product Review*. Single copies of *"Desizing, Scouring and Bleaching Improves Cotton for Outdoor Use"* by Wilson A Reeves, Helen M Robinson, Ralph J Brysson and W Norbert Berard may be obtained free from the Southern Regional Research Laboratory, P O Box 19687, New Orleans 19, La.

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Interest High in Greenville Show

New technological developments and refinements in textile machinery and equipment will be brought into sharp focus at the 21st biennial Southern Textile Exposition at Greenville, SC, October 3-7.

Interest in the show, a fixture in the industry since 1915, is further heightened this year by the current relatively high capital outlay for plant modernization.

In recent years each Greenville show has been larger than the preceding one, the exposition in 1958 having attracted some 340 US and foreign exhibitors. According to Bertha M Green, exposition director, the 1960 show is to be no exception from the standpoint of number, importance and variety of exhibits.

Worner

Ruby K Worner, textile technologist and head of product evaluation investigations of the U S Department of Agriculture's Southern Utilization Research and Development Division, has been chosen for a Fulbright grant. She will be a lecturer and consultant in textile technology and research, with special reference to cotton, at the University of Alexandria, Alexandria, Egypt, for the academic year 1960-61.

Candidates for the honor accorded Dr Worner are selected by the Board of Foreign Scholarships under a program authorized by the Fulbright Act as a part of the International Educational Exchange Program conducted by the Department of State. Basic purpose of the program is to further good will and understanding between the United States and other countries through the exchange of students, teachers, university lecturers, and research scholars.

Dr Worner has been with the Southern Division in New Orleans since February 1940.

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Gilbert G Tynan, president of Burlington Tricot Fabrics Co, a division of Burlington Industries, Inc, has been elected president of Tricot Institute of America, Inc, an organization composed of tricot mill operators and allied industries. He succeeds *Chalres E Lovett,* Deering Milliken, Inc, who is assuming new executive duties at Milliken unrelated to the tricot field.

Announcement has also been made of the election of two additional members to the Institute's board of directors. They are *Bernard Fischer* of Fischer Mills and *Henry Kramer* of Deering Milliken, Inc.

Mr Tynan, who entered the textile field in 1933, has been with Burlington since 1947. He will fill out Mr Lovett's unexpired term which ends in March, 1961.

In taking office, Mr Tynan stated he was prepared to continue the Tricot Institute's efforts for the fabric diversification by end-use.

Rhoads

William S Rhoads has been appointed sales manager of the newly formed Industrial Chemicals Division of Stepan Chemical Co, Chicago, Ill. This promotion is a part of the corporate reorganization going on at Stepan. Mr Rhoads will be headquartered at Stepan's new $1,000,000 administrative and research center at Northfield, Ill. He was formerly Eastern sales manager for Stepan.

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George A Bates has been named manager and *Arthur F McLean* executive assistant at the Sales Bleacheries Division of Sayles Finishing Plants, Inc, Saylesville, RI. Both men will serve on the Division's Management Committee.

Mr Bates, who joined the Sayles organization in 1935, was appointed superintendent in 1948 and general superintendent in 1958.

Mr McLean was plant manager from 1957 to 1960 at the Bradford, RI, plant of the Bradford Dyeing Assoc (USA). Prior to that time, from 1949 to 1957, he was plant superintendent as assistant manager of Glenlyon Print Works Division of Sayles Finishing Plants, Inc at Phillipsdale, RI.

Both men are members of the Rhode Island Section, AATCC. Mr McLean is a past chairman of the Section.

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Aimed at more rapid new product development, Sun Chemical Corp last month announced the appointment of *T A Langstroth* as technical director of the Chemicals Group.

Mr Langstroth's experience in the production of chemicals used in textiles, printing inks, and paints will be utilized to facilitate the exchange of information and the advancement of projects under the technical directors assigned to each of the group's divisions, namely: Ansbacher-Siegle, Warwick Chemical, Facile, Pennsylvania Color, and Electro-Technical Products, all in the United States, and the three foreign divisions, Williams-Ansbacher, England; Warwick, Great Britain; and Societe des Produits Warwick, France. Under Mr Langstroth's direction, it is planned to broaden the Chemicals Group's product lines and enter new markets.

Mr Langstroth joined Sun Chemical after serving nine years as director of pigment and flushed color research for Hilton-Davis Chemical Company, a division of Sterling Drug, Inc.

Climaxing a sustained three-year expansion of foreign facilities and markets, Sun Chemical on July 8 announced establishment of an International Operations Group to augment its penetration of key markets in Europe, the Far East, Africa and the Western Hemisphere .

Bittenbender

William P Bittenbender, whose experience embraces 20 years' service in foreign commerce, has been appointed director of the new group. Since 1957 the company has acquired or built six plants located inside the European Common Market, the European Free Trade Association and the proposed Latin American common market. Sun operates 51 US plants in addition to those overseas.

Mr Bittenbender is now the operating head of a new grouping of plants and companies. Included will be a new plant to be constructed in Mexico for the manufacture of pigments as well as the established chemical, printing ink, coating and finishing facilities in England, France, Australia, Mexico and Venezuela.

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Daniel Shifren, formerly a newswriter for CBS News and a member of the *World-Telegram & Sun's* copydesk staff, has been named to direct the program commemorating the National Retail Merchants Association's 50th anniversary.

J Gordon Dakins, executive vice president of NRMA, who made the annoucement, said the 50th anniversary observance will last throughout 1961, beginning with the Association's annual convention January 8-12, 1961, in the Hotel Statler in New York.

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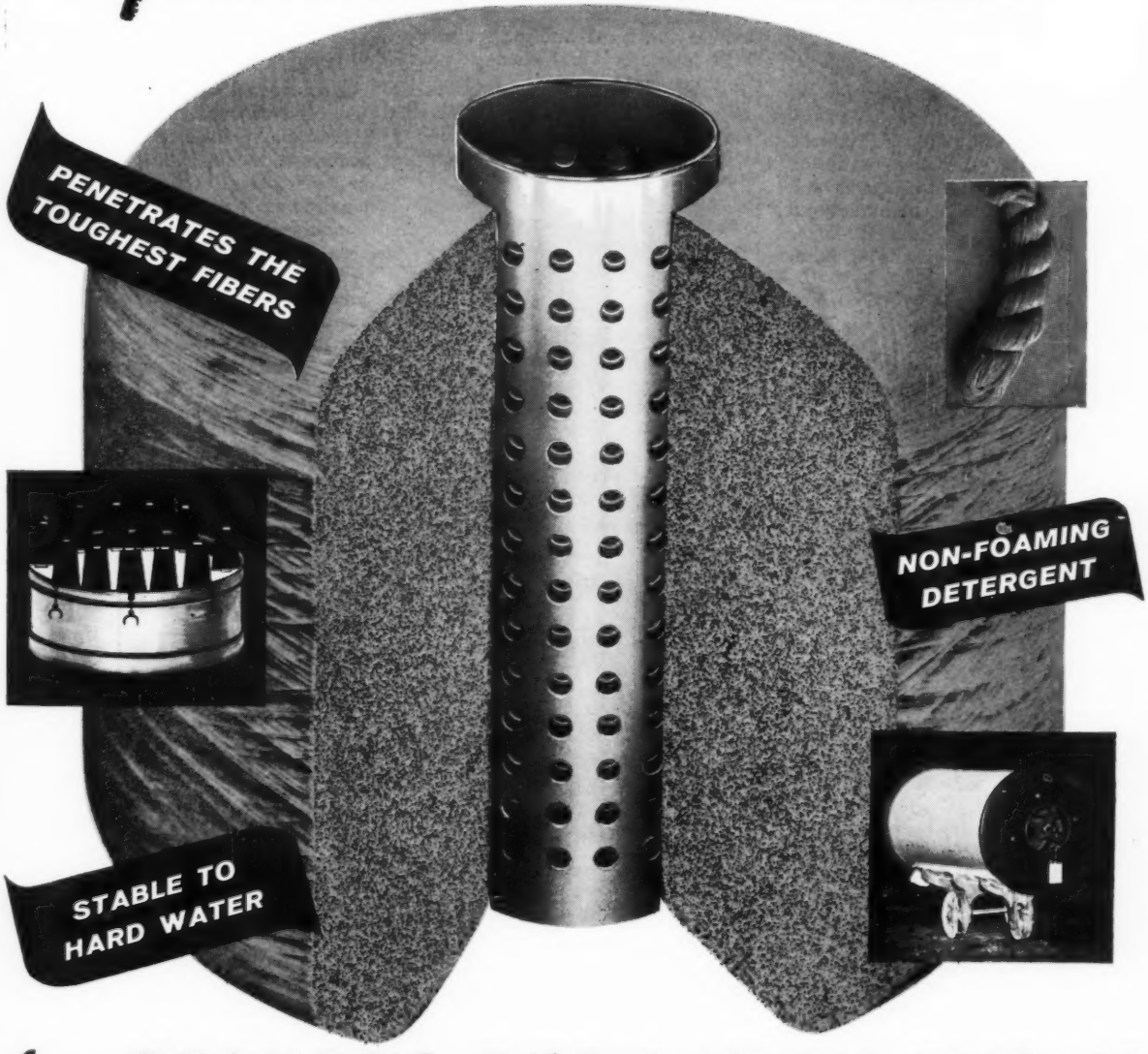

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Sanders

John H Sanders has been named sales manager of the Chemicals Division of Eastman Chemical Products, Inc, Kingsport, Tenn, the marketing subsidiary in the United States and Canada for products manufactured by Tennessee Eastman and Texas Eastman company divisions of Eastman Kodak Co.

Sanders, at the time of his promotion, was a regional sales manager in the ECPI Chemical Sales Division with headquarters in Cleveland, O. He succeeds *Guy A Kirton*, who will concentrate on international sales of Tennessee and Texas Eastman products.

The region formerly supervised by Central and Southeast portions of the Mr Sanders, consisting of the North United States, has been divided between the Mid-West and Eastern Regional offices.

The Eastern regional territory will now include the East and Southeast states. *Robert H Cannon*, sales manager for this region, will continue to maintain his headquarters in New York.

The mid-west region will cover the Middle West and North Central states. Regional offices will remain at Skokie, Ill, under the direction of *Decatur B Campbell* as sales manager.

Sales representation for the Rocky Mountain region and Pacific Coast will continue to be handled by Wilson & Geo Meyer & Co through its eight offices.

R Clay Dubberly has been placed in charge of the Cleveland office, serving Northern Ohio. *George O Trabue*, formerly in the Cleveland office will supervise the new sales office soon to be opened in Buffalo. The Buffalo territory will be western New York, western Pennsylvania, and southern Ontario areas.

Kenneth E Cox, formerly sales representative in the St Louis office, has been appointed district sales manager in the Skokie office. *H Lynn Francisco*, a sales representative, has been transferred from the Skokie office to take charge of the St Louis office replacing Mr Cox.

A new office will also be opened shortly in Kansas City to handle part of the area formerly served by the St Louis office. *Robert M Morrow*, who is being transferred from Kingsport, will be in charge at Kansas Cty.

C P Echerd, formerly a sales coordinator at Kingsport, has been appointed district sales manager in the New York office. He will also direct the sale of Eastman dyes in the Northeastern area and supervise the ECPI laboratory and chemicals distribution center at Lodi, NJ.

At the same time, two men received new assignments under the company's "exchange - of - duties" training program, which provides for periodic shifts of duties among members of the staff to broaden their experience and knowledge in the various phases of the chemical marketing field.

Ralph R Shelly, formerly in charge of the Cincinnati office, will now serve as a sales coordinator in the headquarters office in Kingsport, while *G C DeCroes* will assume charge of the Cincinnati office. Mr Shelly will coordinate sales activities for chemical products of the Texas Eastman Co division in Longview, Texas.

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Mitchell

Ferris W Mitchell, salesman for Allied Chemical's National Aniline Division, retired Thursday, June 30, after 40 years of service.

Mr Mitchell joined National Aniline June 5, 1920 as a laboratory assistant in the Philadelphia Branch office. He transferred to the Philadelphia Branch sales department October 1920. In the intervening years, Mr Mitchell has called on most of the important leather processors and many manufacturers in the textile industry.

•

Sandoz, Inc announced the retirement on June 30, 1960, of *A T Hanes*, vice-president in charge of marketing dyestuffs since 1954. Mr Hanes had been associated with Sandoz in various capacities since 1928. For the future, he plans to devote his efforts to other interests.

Nelson

Appointment of *Elliot Nelson* as senior research and development chemist in the textile pigment research and development laboratories and assignment of *William Meehan* as a salesman in New England has been announced by Geigy Dyestuffs Division of Geigy Chemical Corporation.

Mr Nelson has had wide experience in water-in-oil and oil-in-water pigment printing emulsion colors and auxiliaries, and has published in this field. Prior to joining Geigy, he was associated with the Ansbacher Siegle Div of Sun Chemical Corp and the Textile Color Div of Interchemical Corp.

Mr Meehan, whose office will be in Newton Upper Falls, Mass, has been in charge of Geigy's Leather laboratories in New England for the past four years. He has been associated with the company for the past eleven years, specializing in Geigy "designed for leather" dyestuffs.

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Egon Stern has joined the Gagliardi Research Corp, East Greenwich, RI, as senior research associate.

Dr Stern has approximately twenty years experience as an organic research chemist. He has been associated with Onyx Oil and Chemical Co, Sun Chemical Corp and Pittsburgh Plate Glass Co. During the past several years, Dr Stern has been doing organic synthesis research at the Mellon Institute of Industrial Research.

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Paul E Geiser has been promoted to the newly created position of general manager of petrochemical manufacturing for Continental Oil Co, Houston, Tex. Formerly manager of the detergents division, he will continue to make his headquarters in Houston.

It was announced at the same time that *K R Gerhart* has been promoted to the newly created position of assistant general manager of petrochemical manufacturing for Conoco, with headquarters in Houston. *J E Waples* will succeed Mr Gerhart as superintendent of the Gretna, La, petrochemical plant.

Spearman

Joe E Spearman was appointed technical representative for the Textile Chemical Division, W H & F Jordan, Jr, Mfg Co, Philadelphia, Pa, effective May 1.

Mr Spearman's duties are to provide complete technical sales and service assistance to the Southern textile industry. Prior to joining the Jordan company, he served on the research staff at Callaway Mills, handling product development for tufted carpet manufacturing.

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Rodney Hunt Machine Co, Orange, Mass, has announced the appointment of *H G Thompson* as a textile machinery sales representative for the southern New England and Middle Atlantic states. He will handle the territory from the Orange office.

Succeeding Mr Thompson as sales engineer in charge of the Service & Repair Department of the Textile Machinery Division is *Warren Ramsdell,* who had been employed as a shop erector and outside erector of the T M Division.

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Joel K Lindberg, formerly associate director of the Swedish Institute for Textile Research in Gothenburg, has joined the staff of the Textile Research Center in North Carolina State College's School of Textiles.

At N C State, Dr Lindberg's principal immediate duties will be as adviser in developing State College's newly established program of basic textile research financed by an appropriation from the North Carolina General Assembly.

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E C Slaght Jr has been appointed technical director and assistant to the president of Newport Industries Co, a division of Heyden Newport Chemical Corp, New York, NY.

With offices in Pensacola, Fla, location of the division's headquarters and largest plant, Mr Slaght will organize and coordinate Newport's expansion and new product programs.

Since 1956, Mr Slaght has been manager of Heyden Newport's market development department in New York.

Charatz

Putnam Chemical Corp, Beacon, NY, has announced the appointment of *Milton Charatz* as technical demonstrator for the Mid-Atlantic territory.

Previous to joining Putnam, Mr Charatz was a supervisor of technical service, dyeing and finishing group, with B F Goodrich Chemical Co, Avon Lake, O.

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Procter & Gamble has announced three administrative changes in the Company's sales departments serving the textile industry.

J B Crowe has been appointed manager of the Industrial Specialties Sales Division. In his new post, Mr Crowe will be in charge of those departments handling bulk sales of such products as soaps and synthetic detergents for commercial laundries and other industrial users as well as textile finishing products and glycerine.

Also announced by P & G is the appointment of *H F Nebel* as manager of the Specialty Products Department. This newly created department is in charge of selling P & G textile finishing products and fats for livestock feeds.

J W Burch has been appointed as zone manager of the Textile Finishes Section of the Specialty Products Department to succeed Mr Nebel.

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Dorothy S Lyle, director of consumer relations, National Institute of Drycleaning, Silver Spring, Md, has accepted the presidency of the American Home Economics Association. The term runs until mid-1962. During the past year, Dr Lyle has carried out the duties of the president-elect.

She has served AHEA as recording secretary, chairman of the textiles and clothing section, as a member of several committees, and as a delegate representing the association at a number of meetings.

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Richard R Frey, former assistant secretary of the AATCC, has been named western Massachusetts regional director for Associated Industries of Massachusetts.

Fields

Newly appointed to the sales staff of Arnold, Hoffman & Co, Inc is *Frank P Fields,* who will operate from the Company's sales office in Charlotte, NC.

Prior to joining Arnold, Hoffman, Mr Fields was a supervisor of dyeing and finishing at Mooresville Mills, a Division of Burlington Industries. He is a member of the Piedmont Section, AATCC.

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Food Machinery and Chemical Corp has announced the resignation of *Emil Ott* as vice president for research and development, Chemical Divisions. He will continue as part-time consultant for the company and will devote himself to academic activities. Prior to joining FMC in 1955, Dr Ott had spent sixteen years as research director for Hercules Powder Co.

Henry S Winnicki has been named vice president of the FMC Chemical Divisions. His new responsibilities will include three chemical staff groups, the Central Engineering, Process Development and Pattern Departments. Before his appointment, Mr Winnicki was manager of FMC's Chemicals and Plastics Division.

Sherman K Reed has been named director of research for the Chemical Divisions. Formerly research and development director of FMC's Chemical & Plastics Division, Dr Reed fill be succeeded in this position by *John A Garman.* Dr Reed joined FMC in 1950 and has held research positions with Chlor-Alkali and Niagara Chemical Divisions. Dr Garman has been manager of organic chemical research at FMC's Baltimore, Md, laboratory. He was a research chemist with US Industrial Chemicals Company at its Baltimore plant when FMC acquired this facility in 1954.

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Promotion of *M Earl Heard Jr* to assistant to the vice president of the Saco-Lowell International Division has been announced.

Since 1956 Heard has been sales engineer in the Atlanta, Ga, district sales office of the Saco-Lowell Textile Machinery Division.

Edward H Little, chairman of the board of Colgate-Palmolive Co, retired from the post of chief executive officer of the company on July 14.

George H Lesch, who was elected president last April, was named to succeed Mr Little as chief executive officer, a position held by Mr Little since 1938.

Mr Little joined Colgate & Co in 1902 as a salesman. In 1938, when Mr Little became president and chief executive officer of the Colgate-Palmolive Co, worldwide sales of the company were under $100 million and profits for the preceding year were $782,000. Sales are currently at the rate of $600 million and profits last year were over $25 million.

Today the Colgate-Palmolive Company is one of the world's leading manufacturers of soap, detergents and toilet articles. During the 22 years that Mr Little has headed the business, the Company's sales have totalled more than $7 billion. Net profits in this period have aggregated $250 million, of which about $120 million has been paid to stockholders as cash dividends. In addition, the Company has paid over 20% in stock.

Since the end of World War II, worldwide outlays for plant expansion and modernization have totalled more than $180 million. Future expenditures on presently authorized capital projects are estimated at $41 million.

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Shell Chemical Co has transferred its textile industry sales development activities from New York to Charlotte, NC. *Robert J Solari* will be field director of textile development activities. It will be his responsibility to coordinate the various activities of Shell Chemical Co as they relate to textile research, development and marketing.

Formerly Mr Solari devoted his efforts exclusively to the pulp and paper industry. He was requested by the Technical Association of the Pulp and Paper Industry to write the chapter, "Peroxide Bleaching", for the TAPPI bleaching monograph. His previous research interests involved catalysis and n-paraffin vapor pressure. He is a member of AATCC's Metropolitan Section and TAPPI.

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George H Hotte, director of Allied Chemical's Fiber Marketing Department, has been appointed to the Harold DeWitt Smith Medal awards committee of the American Society of Testing Materials. Mr Hotte's appointment is for a two-year period.

Rohm & Haas Co has announced the appointment of *Walter B Hayes* as manager of the Company's Knoxville, Tenn, plant to take the place of *Kenneth R Kaiser*, who died recently. Mr Hayes was formerly production manager at the plant.

In addition to the appointment of Mr Hayes, the Company has announced that *Enno T Sauer* will be transferred from the production control group in the Philadelphia office to the Knoxville plant to serve as assistant plant manager within the next several months.

R K Collins Jr, who has been plant engineer at Knoxville for some years, has been appointed chief engineer of the plant effective immediately.

•

J Edward Dempsey has been named assistant manager of Du Pont's New York consulting service for dyeing and finishing effective September 1.

Succeeding Mr Dempsey as assistant manager of the division's Chicago district sales office will be *F L Shackelford Jr*, who has recently returned to this country from an assignment with the Du Pont Mexican subsidiaries.

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Valchem, a unit of United Merchants & Manufacturers, Inc, has announced the appointment of *Raymond W Hargrove Jr* to the position of sales manager.

Mr Hargove, who joined Valchem from Reichhold Chemicals, Inc, will make his headquarters at the Langley, SC, plant. He will call primarily on industrial accounts in the Southeast.

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New assignments for *William L Robertson*, *Joseph L Suhadolnik*, *John L Gudgel*, and *Henry J Keigwin* have been announced by Union Carbide Chemicals Company.

Mr Robertson, previously a technical representative in the Newark district, has been assigned as an assistant in the Industrial Product Managers' Group where he will work in the areas of plasticizers and monomers.

Mr Suhadolnik, previously a technical representative in the Newark district office, has been transferred to field sales.

Mr Gudgel has been transferred to the Detroit district office as a technical representative. He was previously in the General Sales Office in New York.

Mr Keigwin has been transferred to the Newark district office as a technical representative. He was previously in the General Sales Office in New York.

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Bertrand W Hayward, president of the Philadelphia Textile Institute, was re-elected head of the college and *Everett L Kent*, Kent Mfg Co, was re-elected PTI Foundation president at the recent annual meetings of both corporations and their trustees.

Re-elected to the Institute Board for three-year terms were *Frederic H Barth*, Industrial Rubber Co; *Morris R Brownell Jr*, Philadelphia National Bank; *Milton Harris*, Harris Research Laboratories; *W Lyle Holmes Jr*, Archibald Holmes & Sons *Frederic W Howe Jr*, Crompton and Knowles Corp; *Rinaldo A Lukens*, Gloversville Continental Co: *R Carter Henry*, J P Stevens & Co, Inc; *John G Schoepf*, Asten-Hill Mfg Co; and *Robert A Smith*, Spinning Division, American Viscose Corp.

Newly elected to the Institute Board for three-year terms were *John H Dillon*, Textile Research Institute; *Alden R Loosli*, American Cyanamid Co; *Robert M Schwarzenbach*, Schwarzenbach-Huber; and *William W Tomlinson*, Temple University.

At the Trustees' meeting, the following officers were re-elected in addition to Mr Hayward for the coming year: W Lyle Holmes Jr, chairman; *William F MacDonald*, E F Houghton & Co; *C Scott Althouse*; *Julius Zieget*, PTI, secretary and treasurer; and *Thomas Hyndman*.

The Trustees passed a budget in excess of $600,000 for the operation of the college for the 1960-61 fiscal year.

Members of the Foundation's Trustees who were re-elected for three-year terms were *Leon Brick*; *F Everett Nutter*; *Bertrand W Hayward*; *Frank H Kaufmann*, Steel Heddle Mfg Co; and *Charles J Webb 2nd*, Charles J Webb Co.

New members elected for a three-year terms were *Charles W Carvin Jr*, Chemstrand Corp; *John B Caron*, Caron Spinning Co; *William H Holmes*, Holmes & Co; *Jay N Lipsey*, The Jay Co; *Burrell Oughton*, Windsor Mfg Co; and *Herbert Pleet*, Yorkshire Worsted Mills.

Other officers re-elected in addition to Mr Kent at the Foundation's meeting were: *Theodore B Hayward*, first vice president; *Lindsey H Mason*, Philadelphia Dye Works, second vice president; *Richard S Cox, PTI*, executive secretary & treasurer; and *Russell C Osborne*, R C Osborne & Co, secretary.

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Recipients of several scholarships at North Carolina State College's School of Textiles have been announced as follows:

Senior *John F Stevens* is the 1960-61 winner of the $500 Owens-Corning Fiberglas Corp Scholarship. In addition to this scholarship, Stevens, who is employed this summer by Gaffney Mfg Co, Gaffney, SC, receives $333.33 per year from a Shapiro Scholarship.

Senior *William K Poole* has been awarded a $500 Chemstrand Corp Scholarship. Poole, who also has been the recipient of a Geigy Dyestuffs $225 scholarship, is employed at the Charlotte Development Laboratories of Celanese Corp this summer.

Seniors *Lloyd V Edmonds* and *Gene E Inman* have been awarded $350 U S Rubber Co Scholarships.

Michael L Ross will enter State College in the fall as a recipient of a $500 textile research scholarship awarded by the Textile Research Center at the School of Textiles.

During the period of their four years in college, 13 students who have enrolled for the fall term will receive a total of $39,000 in scholarships from the Dickson Foundation. This scholarship program, which offers awards of $750 per year, was established in the spring of 1957 by American and Efird Mills, of which R S Dickson is president, and his son, Allen, a '52 State College graduate, is vice president.

Dickson Scholarship recipients are: *Glenn B Talbert*, senior; *Charles E Huffstetler*, senior; *Ronald R Medders*, senior; *Wade H McSawin*, junior; *Reggie A Crowell*, junior; *Orson L McCotter*, junior; *Charles L Kale*, sophomore; *Bobby G Harris*, freshman; *Raymond L Shelton*, freshman; *Edgar W Lefler III*, freshman; *Walter E Long*, freshman; *Hoyt G Lowder*, freshman; and *Forrest K McIntosh*, junior.

F A TAGLIABUE

FELIX TAGLIABUE, 61, president and sole owner of Palisades Dyeing Corp, Peacedale, RI, died recently at Monmouth Medical Center, Long Branch, NJ.

Mr Tagliabue had been associated with the textile wet-processing industry for better than 40 years. He had been president and owner of Palisades Piece Dye Works, North Bergen, NJ; owner of the Dixie Dye Works, Emporia, Va; United Piece Dye Works, Los Angeles, Calif; and partner of Northern Dye Works, North Bergen, NJ, which he sold to Frank J Percarpio in 1954.

He is survived by his widow, Sigrid; a son, Robert; a brother, Joseph; a daughter, his mother and a sister.

D E MARNON

DONALD E MARNON, 40, technical director of Otto B May, Inc, Newark, NJ, died last month in Mountainside Hospital after a six-week's illness.

Mr Marnon had been with Otto B May since last September. Prior to that time he had worked with Berkshire Color and Chemical Co, Reading, Pa; Koppers Co, Inc's Chemicals and Dyestuff Division (formerly American Aniline Products); and General Dyestuff Corp.

Mr Marnon was probably best known for his work with the late John Hennessey in developing the Marhen Process. The author of numerous articles, Mr Marnon was a past chairman and councilor for the Metropolitan Section, AATCC. He was in charge of the Ladies Program for the Perkin Centennial in 1956.

Born in Boise, Idaho, Mr Marnon was graduated from the University of Portland (Ore), and received his master's degree from the University of Notre Dame.

He is survived by his widow, Cathryn, two daughters, his father and sister.

H M THORPE

HUGH M THORPE, former dyemaster for Realsilk Hosiery Mills, died recently in Portage, Wis, where he was chief chemist and dyer for Portage Hosiery Mills. He was 62.

Mr Thorpe had been with Realsilk for 32 years before going with Portage.

He is survived by his widow; two sons, Marvin and Hugh Jr; a brother, John; and four grandchildren.

L F PEABODY

LESTER F PEABODY, 78, a former executive of The Ohio Leather Company, died on Saturday, July 16, in Verona, NJ. Active in the leather industry for 40 years, Mr Peabody was one of the oldest members of the American Leather Chemists Association He is survived by his widow, a daughter, and two sons, Donald L Peabody of Sandoz, Inc, and Roger Peabody of Amalgamated Leather Co, Wilmington, Del.

H HELBURN

HUGO HELBURN, founder and treasurer of Apex Chemical Co Inc, Elizabethport, NJ, died on July 3 at the age of 101.

He was active in the business until July 1959 at which time he accidentally fell and broke his left arm. He was a pioneer manufacturer of chemical specialties in this country starting in 1900 and manufacturing products for both textile mills and leather tanneries.

GUY NEWCOMB

GUY H NEWCOMB, 75, retired executive of E I du Pont de Nemours & Co, Inc, died recently of a heart attack. He retired in 1946 as manager of the Philadelphia office of Du Pont's dyes and chemicals division after 25 years service with the Company.

S R BUC

SAUL R BUC, research fellow at the Central Research Laboratories, General Aniline & Film Corp, Easton, Pa, died on June 5 at Memorial Hospital, New York, NY. He was 45 years old.

Dr Buc joined GAF in 1946 as a research chemist. He was promoted to the position of research fellow in 1949.

He was a graduate of Rutgers University with a BS degree in chemistry in 1934. He received a Ph D degree in chemistry from Johns Hopkins University in 1938, and taught there from 1938 to 1941.

While teaching at Johns Hopkins he was co-author of "Introduction to the Practice of Organic Chemistry." He was also the author of numerous scientific papers.

Dr Buc was a member of the American Chemical Society since 1936 and chairman of ACS' Lehigh Valley Section since 1950. He was also a life fellow of the Chemical Society of London, and a life member of the American Society for the Advancement of Science. He also held numerous patents.

In January 1958 Dr Buc received an appointment as member of an advisory committee for the School of Chemistry, Rutgers Univ, New Brunswick, NJ.

He is survived by his widow, a son, a step-son and a brother, George L Buc, assistant to the vice president of Fisher Scientific Co, Pittsburgh, Pa.

F MARSCHALL

FRANZ MARSCHALL, research chemist at the Central Research Laboratories of General Aniline & Film Corp, Easton, Pa, died suddenly in his home on May 20. He would have been 63 the following day.

Dr Marschall observed the 25th anniversary of his employment with the company on April 22. His specific field of research was on dyestuff intermediates.

Dr Marschall joined General Aniline in 1935, and worked for several years at the company's Grasselli plant in Linden, NJ,. He joined the Central Research Laboratories, Easton, Pa, in 1942.